



**Community Development Department
Building & Safety Division**

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December 9, 2010



Ms. Melissa Jones, Executive Director
California Energy Commission
Media and Public Communications Office
1516 Ninth Street, MS-29
Sacramento, CA 95814-5512

Subject: Application to California Energy Commission for Approval to Enforce
 Locally Adopted Energy Standards in the City of Fremont, California

Dear Ms. Jones,

The City of Fremont hereby submits the enclosed package as an application to the California Building Standards Commission to enforce locally adopted energy standards.

Pursuant to California Health and Safety Code Sections 17958, 17958.5, 17958.7 and 18941.5; on November 23, 2010, the Fremont City Council adopted the following ordinance and resolutions to adopt and amend the 2010 Building Standards Codes and to document the local conditions and findings that justify the local amendments and demonstrate that the proposed local energy standards are cost effective.

- **ORDINANCE 23-2010:** AN ORDINANCE OF THE CITY OF FREMONT ADOPTING AND AMENDING THE 2010 CALIFORNIA BUILDING, PLUMBING, MECHANICAL, ELECTRICAL, EXISTING BUILDING, RESIDENTIAL AND GREEN BUILDING CODES, AMENDING FREMONT MUNICIPAL CODE TITLE VII (BUILDING REGULATIONS), CHAPTER 1 (FREMONT BUILDING CODE), ARTICLES 1 THROUGH 6 AND ADDING ARTICLES 8 AND 9, AND MAKING CONFORMING AMENDMENTS TO TITLE VII, CHAPTER 3 (FREMONT HOUSING CODE) AND TITLE VII, CHAPTER 4 (FREMONT ABATEMENT OF DANGEROUS BUILDINGS CODE)
- **RESOLUTION NO. 2010-66:** A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF FREMONT, CALIFORNIA, MAKING EXPRESS FINDINGS THAT MODIFICATIONS TO THE 2010 CALIFORNIA BUILDING STANDARDS CODE ARE REASONABLE NECESSARY DUE TO LOCAL CONDITIONS
- **RESOLUTION NO. 2010-67:** A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF FREMONT REGARDING COST EFFECTIVENESS OF LOCAL AMENDMENTS TO ENERGY REGULATIONS THE 2010 CALIFORNIA GREEN BUILDING CODE

The City of Fremont proposed to adopt local energy standards that require new residential buildings six stories or less in height to be designed and constructed so that they consume 16% less energy than would otherwise be permitted by the California Energy Code contained in Title 24, Part 6. The specific language of the proposed local energy standards are articulated in City of Fremont Ordinance 23-2010 which was introduced on October 26, 2010 and adopted on November 23, 2010 and will become effective on January 1, 2011.

The City of Fremont has determined that if the incremental additional construction cost to achieve the proposed 15% reduction in energy consumption can be paid back through energy savings in less time than the useful life of a new building, than the investment in future energy savings is cost effective.

The typical useful life for new residential buildings in the City of Fremont is between 50-years and 80-years; therefore, the average useful life for residential buildings of 65-years.

In considering the need for local energy standards, the City of Fremont utilized "Mocropas 8" the State of California approved energy compliance software and the 2008 Building Energy Efficiency Standards to calculate energy use and energy savings.

The City of Fremont also relied on the "Climate Zone 3 Cost-Effectiveness Study" prepared by Gabel Associates, LLC, dated July 19, 2010. This study evaluated the incremental construction costs necessary to achieve a 15% reduction in energy use. This study concludes that the simple payback period to recover the incremental additional construction costs ranges from 14.7-years to 35.6-years. This range of payback period considers a number of different building sizes and heights as well as a range of possible features that are more or less effective at reducing overall energy consumption. A copy of this Cost-Effectiveness Study is attached.

Based on the Gabel Associates Cost-Effectiveness Study, the average payback period to recover the original construction cost to achieve a 15% reduction in energy use is 25.2-years. In the City of Fremont the average useful life for residential buildings is 65-years. This average payback period is less than the average useful life for new residential buildings.

Therefore, the City of Fremont finds that the proposed local energy standards that require new residential buildings six-stories or less in height to be designed and constructed to consume 15% less energy than would otherwise be permitted by the State of California Energy Code are cost effective.

One original and three copies of this letter and the associated attachments are hereby transmitted to the California Energy Commission as the City of Fremont Application package.

If you have any questions regarding this matter or require any additional documents or information, please feel free to contact this office at 510-494-4470.

Sincerely,



Steven W. Davis
Building Official

Attachments:

Ordinance 23-2010
Resolution 2010-66
Resolution 2010-67
Cost Effectiveness Study dated July 19, 2010

ORDINANCE NO. 23-2010

AN ORDINANCE OF THE CITY OF FREMONT ADOPTING AND AMENDING THE 2010 CALIFORNIA BUILDING, PLUMBING, MECHANICAL, ELECTRICAL, EXISTING BUILDING, RESIDENTIAL, AND GREEN BUILDING CODES, AMENDING FREMONT MUNICIPAL CODE TITLE VII (BUILDING REGULATIONS), CHAPTER 1 (FREMONT BUILDING CODE), ARTICLES 1 THROUGH 6 AND ADDING ARTICLES 8 AND 9, AND MAKING CONFORMING AMENDMENTS TO TITLE VII, CHAPTER 3 (FREMONT HOUSING CODE) AND TITLE VII, CHAPTER 4 (FREMONT ABATEMENT OF DANGEROUS BUILDINGS CODE)

The City Council of the City of Fremont does ordain as follows:

SECTION 1. REPEALS

Those portions of Ordinance 31-2007 amending Fremont Municipal Code Title VII, Chapter 1, Articles 1 through 6 that are in conflict with or superseded by the provisions of this ordinance are repealed.

SECTION 2. FMC §7-1102 AMENDED

Section 7-1102 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 1 (General Provisions) is amended to read:

Sec. 7-1102 Administration & Enforcement

(a) The Building and Safety Division is responsible for the administration and enforcement of the provisions of Articles 1 through 6, 8 and 9 of this code. "Building Official" as referenced in this code means the Building Official.

(b) [text not changed].

SECTION 3. FMC §7-1110 AMENDED

Section 7-1110 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 1 (General Provisions) is amended to read:

Sec. 7-1110 Permit Applications Pending as of December 31, 2010

The provisions of Articles 2 through 9 shall take effect on January 1, 2011 except that where complete working drawings, plans, structural designs and specifications for buildings have been filed for building permits before this date, permits may be issued based on the previous ordinances and codes effective at the time of filing, and the applicant may proceed with the construction, provided physical construction is started within one hundred eighty (180) days from the date of issuing the permit and continued to completion. Where

construction has not commenced within 180 days of the issuance of a building permit which has been issued under any previous ordinance, no renewal or extension of such building permits shall be granted unless all of the requirements of the 2010 California Building Standards Code, as amended by the City of Fremont, are met.

SECTION 4. FMC §7-1114 AMENDED

Section 7-1114 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 1 (General Provisions) is amended to read:

Sec. 7-1114 Findings

The City Council has adopted updated findings by resolution under Health and Safety Code Section 17958.7 for local modifications to the building standards contained in the 2010 California Building Standards Code based on local climatic, geological and topographical conditions as required by Health and Safety Code Sections 18941.5 and 17958.5.

SECTION 5. FMC §7-1118 AMENDED

Section 7-1118 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 1 (General Provisions) is amended to read:

Sec. 7-1118 Boards of Appeals

(a) Where the provisions of this Chapter provide for a board of appeals, the board shall be the Fremont City Council. The decisions of the board are final as to the City. The board shall have no authority relative to notices, orders, or citations issued under Fremont Municipal Code Sections 1-3100 *et seq.*, 1-4100 *et seq.* or 4-9100 *et seq.*, and shall have no authority relative to interpretation of the administrative provisions of this Chapter nor shall the board be empowered to waive requirements of this Chapter.

(b) An application for appeal shall be based on a claim that the true intent of this code have been incorrectly interpreted, the provisions of this code do not fully apply or an alternative provides at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

SECTION 6. DRAFTING SYNTAX

Fremont Municipal Code (FMC) section text is italicized in this ordinance to assist the reader in distinguishing between City of Fremont modifications to the California Building Standards Code and the FMC section text adopting the modifications.

For each section of the California Building Standards Code that is modified in part by the City of Fremont, whole subsections that are not modified are indicated by the subsection number followed by “{CBC text not modified}” with the appropriate acronym for the specific code, which is to be codified as written. Each subsection that is deleted in its entirety by the City of Fremont is indicated by the subsection number followed by “- deleted”.

SECTION 7. REPEAL OF FMC §7-1220.406 THROUGH 7-1221.113

Sections 7-1220.406, 7-1220.508, 7-1220.602, 7-1220.704, 7-1220.708, 7-1220.711, 7-1220.701A, 7-1220.702A, 7-1220.704A, 7-1220.902, 7-1220.903, 7-1220.1017, 7-1220.1019, 7-1220.1507, 7-1220.1612, 7-1220.1613, 7-1220.1614, 7-1220.1704, 7-1220.1709, 7-1220.1802, 7-1220.1803, 7-1220.1908, 7-1220.2205, 7-1220.2305, 7-1220.2308, 7-1220.2505, 7-1220.2508, 7-1220.3401, 7-1220.3406, 7-1221, 7-1221.103, 7-1221.104, 7-1221.105, 7-1221.106, 7-1221.108, 7-1221.109, 7-1221.110, 7-1221.111, 7-1221.112, and 7-1221.113 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code) of Article 2 are repealed.

[FREMONT BUILDING CODE]

SECTION 8. FMC §7-1210 AMENDED

Section 7-1210 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) is amended to read:

Sec. 7-1210 Adoption of the 2010 CBC with Amendments

The 2010 edition of the California Building Code as published by the International Code Council is adopted as the Building Code of the City of Fremont, California, as if fully set out in this Article. and is amended as provided in this Article. A copy of 2010 CBC shall be maintained on file in the office of the City Clerk.

SECTION 9. FMC §7-1212 AMENDED

Section 7-1212 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) is amended to read:

Sec. 7-1212 Adoption of Certain 2010 CBC Appendix Chapters

The following Appendix Chapters of the 2010 California Building Code are adopted by the City of Fremont. The remaining Appendix Chapters are not adopted.

- (1) Appendix C (Agricultural Building)
- (2) Appendix I (Patio Cover)

SECTION 10. FMC §7-1214 ADDED

Section 7-1214 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1214 Adoption of 2010 CBC Chapter 1, Division II

(a) Chapter 1, Division II of the 2010 California Building Code is adopted by the City of Fremont and made a part of the Fremont Building Code, except for the sections set forth in

subsection (b). References to model codes in the adopted sections shall mean the corresponding California Codes as adopted by the City of Fremont.

(b) The following sections of Chapter 1, Division II of the 2010 California Building Code are not adopted: 101, 102, 103, 113, and 114.

SECTION 11. FMC §7-1220 AMENDED

Section 7-1220 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) is amended to read:

Sec. 7-1220 Amendments to 2010 CBC; Numbering

The 2010 California Building Code is amended as provided in Sections 7-1220.103 through 7-1220.3408. The number to the right of the decimal point in these sections corresponds to the section in the 2010 California Building Code that is amended.

SECTION 12. FMC §7-1220.104 ADDED

Section 7-1220.104 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.104 Amendment of 2010 CBC Section 104 (Duties and Powers of the Building Official)

Section 104 of the 2010 California Building Code is amended as follows:

104.1 – 104.11.4 {CBC text not modified}

104.12 Limits on repair/remodel for R-3 and U-1 occupancies. When the scope of work for R-3, single family dwelling and U-1, garage or storage, occupancies involves the removal or replacement of 50 percent or greater of the linear length of the walls of the building (exterior plus interior) and 50 percent of the roof within a one-year period, the project shall be considered as new construction; and the entire building shall comply with all current codes including local ordinances. For automatic fire extinguishing system requirements, see FMC Section 7-1220.903.

104.13 Authority to condemn building service equipment. Whenever the Building Official ascertains that any building service equipment regulated in the technical codes has become hazardous to life, health, property, or becomes unsanitary, he or she shall order in writing that such equipment either be removed or restored to a safe or sanitary condition, whichever is appropriate. The written notice itself shall fix a time limit for compliance with such order. No person shall use or maintain defective building service equipment after receiving such notice.

When such equipment or installation is to be disconnected, a written notice of the disconnection and causes therefore shall be given within 24 hours to the serving utility, the owner and occupant of such building, structure or premises.

When any building service equipment is maintained in violation of the technical codes and in violation of any notice issued pursuant to the provisions of this Section, the Building Official may institute any appropriate action to prevent, restrain, correct or abate the violation.

104.14 Connection after order to disconnect. No person shall make connections from any energy, fuel or power supply nor supply energy or fuel to any building service equipment which has been disconnected or ordered to be disconnected by the Building Official or the use of which has been ordered to be discontinued by the Building Official until the Building Official authorizes the reconnection and use of the equipment.

SECTION 13. FMC §7-1220.105 ADDED

Section 7-1220.105 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.105 Amendment of 2010 CBC Section 105 (Permits)

Section 105 of the 2010 California Building Code is amended as follows:

105.1 {CBC text not modified}

105.1.1 - 105.1.2 - deleted

105.2 Work exempt from permit{CBC text not modified}

Building:

1. {CBC text not modified}
2. Fences not over 6 feet (1829 mm) high when not subject to specific City of Fremont Planning and Zoning regulations.
3. {CBC text not modified}
4. Retaining walls that are not over 4 feet in height measured from the bottom of the footing to the top of the wall unless supporting a surcharge or impounding Class I, II or 111-A liquids. Retaining walls in hillsides or retaining walls subject to City of Fremont Planning, Zoning, and Grading regulations or any other City Council resolutions are not subject to permit exemptions.
5. – 13. {CBC text not modified}

Electrical {CBC text not modified}

Gas {CBC text not modified}

Mechanical {CBC text not modified}

Plumbing {CBC text not modified}

105.2.1 – 105.3.1 {CBC text not modified}

105.3.2 Time limitation of application. An application for a permit for any proposed work shall be deemed to have been abandoned 180 days after the date of filing unless such application has been pursued in good faith or a permit has been issued; except that the Building Official is authorized to grant one extension of time for an additional period not exceeding 180 days.

105.4 {CBC text not modified}

105.5 Expiration. Every permit issued by the Building Official under the provisions of this code shall expire by limitation and become null and void if the building or work authorized by such permit is not commenced within 180 days from the date of such permit, or if the building or work authorized by such permit is suspended or abandoned at any time after the work is commenced for a period of 180 days. The construction is deemed suspended or abandoned unless an inspection indicating substantial progress in construction has been requested every 180 days or sooner. Before work may resume on a construction project declared suspended or abandoned, a new permit first must be obtained. Where suspension or abandonment has not exceeded one year and no changes have been made or will be made to the original plans and specifications for the work, the renewal fee shall be one half the amount required for a new permit for the work. Otherwise, the renewal fee shall be the full amount required for a new permit.

Any permittee holding an unexpired permit may apply for an extension of the time within which work may commence under that permit when the permittee is unable to perform work within the time required by this Section for good and satisfactory reasons. The Building Official may extend the time for action by the permittee for a period not exceeding 180 days on written request by the permittee showing that circumstances beyond the control of the permittee have prevented action from being taken.

105.6 – 105.7 {CBC text not modified}

SECTION 14. FMC §7-1220.107 ADDED

Section 7-1220.107 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.107 Amendment of 2010 CBC Section 107 (Submittal Documents)

Section 107 of the 2010 California Building Code is amended to read:

107.1 – 107.2.5.1 {CBC text not modified}

107.2.6 Required plat of survey. Any person, firm or corporation applying for a

permit for the erection or construction of a building or structure, or moving an existing building to a new location shall, when required by the Building Official, file with the set of plans and specifications required by the foregoing provisions of this Section a minimum of three (3) copies of a plat of a survey of the property proposed to be improved by said building or structure, on which plat shall be delineated the accurate location of said proposed improvement and the grades at which it is to be constructed, the location of every existing building on the lot, the location of existing curbs, sidewalks, and main sewers and the location of waterways, storm drains, inlets, and culverts affecting the lot. Said plat shall be drawn to a scale of not smaller than twenty (20) feet to one (1) inch, unless authorized by the Building Official, and shall show the contours at one (1) foot intervals for predominant ground slopes between level and four (4) percent and five (5) foot contours for predominant ground slopes over four (4) percent which contours shall extend to the center of the street when said Street is unimproved, or to the curb line when the street is improved. All grades and contours shall be based on United States Coast and Geodetic Survey datum (mean sea level) except when authorized otherwise by the Building Official. The survey shall have been made by a licensed land surveyor or registered civil engineer in the State of California and the map of said survey shall be signed and certified with their license or certificate number, and the property shall be located thereon by map or deed distance to the nearest street intersection. The exterior boundaries of said property shall be clearly outlined on the ground by appropriate permanent stakes or monuments. The location of said stakes or monuments shall be shown on the survey map with elevations thereon.

107.3 {CBC text not modified}

107.3.1. Approval of construction documents. When the Building Official issues a permit, the construction documents shall be approved, in writing or by stamp, as “Approved”.

107.3.2 – 107.5 {CBC text not modified}

SECTION 15. FMC §7-1220.109 ADDED

Section 7-1220.109 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.109 Amendment of 2010 CBC Section 109 (Fees).

Section 109 of the 2010 California Building Code is amended as follows:

109.1 {CBC text not modified}

109.2 Schedule of permit fees. On buildings, structures, electrical, gas, mechanical, and plumbing systems or alterations requiring a permit, a fee for each permit shall be paid as required, in accordance with the schedule of fees established by resolution of the Fremont City Council. Where issuance of a permit for the construction of part of a building or structure has been approved, the fees shall be established by a City of

Fremont Fee Resolution as adopted by the City Council.

109.3 Building permit valuation. The value to be used in computing the building permit and building plan review fees shall be the total value of all construction work for which the permit is issued, as well as all finish work, painting, roofing, electrical, plumbing, heating, air conditioning, elevators, fire-extinguishing systems and any other permanent equipment.

For a partial plan review and/or partial building permit, the building permit valuation for the first permit shall be based on the total value of all construction work for the entire completed building, including all finish work, painting, roofing, electrical, plumbing, heating, air conditioning, elevator, fire extinguishing systems and any other permanent equipment. The building and plan review fees for each subsequent partial permit shall be at the rate of 50 percent of the fee due for the value of the phase.

109.3.1 Plan review fees. When submittal documents are required by Section 106.1 a plan review fee shall be paid at the time of submitting the documents for plan review. Said plan review fee shall be as established by resolution of the City Council.

The plan review fees specified in this Section are separate fees from the permit fees specified in Section 109.2 and are in addition to the permit fees.

When submittal documents are incomplete or changed so as to require additional plan review or when the project involves deferred submittal items as defined in Section 107.3.4.2, an additional plan review fee shall be charged at the rate established by resolution of the City Council.

109.4 {CBC text not modified}

109.4.1 An investigation fee, in addition to the permit fee, shall be collected whether or not a permit is then or subsequently issued. The investigation fee shall be equal to the amount of the permit fee required by this code. The payment of such investigation fee shall not exempt any person from compliance with all other provisions of this code nor from any penalty prescribed by law.

109.5 {CBC text not modified}

109.6 Refunds. The Building Official is authorized to establish a refund policy. As part of the policy, the Building Official may authorize refunding a portion of the fee equal to 80 percent of the permit fee paid less the application fee when no work has been done under a permit issued in accordance with this code.

SECTION 16. FMC §7-1220.110 ADDED

Section 7-1220.110 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.110 Amendment to 2010 CBC Section 110 (Inspections)

Section 110 of the 2010 California Building Code is amended as follows:

110.1 – 110.6 {CBC text not modified}

110.6.1 Gas or electrical utilities. There shall be no clearance for connection of gas or electrical utilities until final building, electrical, plumbing, heating, air conditioning, security and zoning inspections are made and approval has been given on any building sought to be connected to such utilities unless approval has been first obtained from the Building Official, as provided by the Temporary Certificate of Occupancy in Section 110.3.

110.7 Re-inspection fee. When re-inspection is required, an additional inspection fee shall be charged at the rate fee established by resolution of the City Council.

SECTION 17. FMC §7-1220.111 ADDED

Section 7-1220.111 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.111 Amendment of 2010 CBC Section 111 (Certificate of Occupancy)

Section 111 of the 2010 California Building Code is amended as follows:

111.1 Use and occupancy. {CBC text not modified}

Exception: Group R-3 and Group U Occupancies.

111.1.1 Change in Use. Where a change in the existing occupancy classification is made, an inspection of the premises as deemed necessary by the Building Official to determine that the provisions of Section 111.1 are met before issuance of said certificate. Said certificate of occupancy shall be obtained from the Building Official upon completion of an application for the certificate and the payment of a fee as established by resolution of the City Council.

111.2 Certificate issued. After final inspection when it is found that the building or structure complies with the provisions of this Code and other laws which are enforced by the City of Fremont, and, when required, the Engineer or Architect of Record has stated in writing that based on field observation conducted by him or her, or his or her designee, the building or structure is in general conformance with the approved plan, then the Building Official shall issue a certificate of occupancy which shall contain the following:

1. The building permit number.
2. The address of the building.

3. The name and address of the owner.
4. A description of that portion of the building for which the certificate is issued.
5. A statement that the described portion of the building complies with the requirements of this code for the group and division of occupancy and the use for which the proposed occupancy is classified.
6. The name of the Building Official.

111.3 {CBC text not modified}

111.3.1 Limitations. An application for temporary certificate of occupancy must be filed, clearance for connection of the gas and electrical utilities must be obtained and the required fees as established in the City of Fremont Fee Resolution shall be paid before the temporary certificate of occupancy is issued.

111.3.2 Discontinuance of temporary occupancy. In the event the building is not completed and ready for final inspection in the time prescribed by the Building Official, the building shall be vacated and the utilities disconnected until such time as the building is completed and final inspection is made and a certificate of occupancy is issued as set forth above.

111.4 {CBC text not modified}

SECTION 18. FMC §7-1220.112 ADDED

Section 7-1220.112 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec.7-1220.112 Amendment of 2010 CBC Section 112, (Service Utilities)

Section 112 of the 2010 California Building Code is amended as follows:

112.1 – 112.2 {CBC text not modified}

112.3 Authority to disconnect utilities. The Building Official or his or her authorized representative shall have the authority to disconnect any utility service or energy supplied to the building, structure or building service equipment therein regulated by this code or the technical codes in case of emergency where necessary to eliminate an immediate hazard to life or property. The Building Official shall whenever reasonably possible notify the serving utility, the owner and occupant of the building, structure or building service equipment of the decision to disconnect prior to taking such action, and shall notify such serving utility, owner and occupant of the building, structure or building service equipment, in writing, of such disconnection immediately thereafter.

SECTION 19. FMC §7-1220.406 ADDED

Section 7-1220.406 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.406 Amendment to 2010 CBC Section 406 (Motor Vehicle Related Occupancies)

Section 406 of the 2010 California Building Code is amended as follows:

406.1 – 406.1.3 {CBC text not modified}

406.1.4 Separation. {CBC text not modified}

1. The private garage shall be separated from the dwelling unit and its attic area by means of a minimum 5/8-inch Type X gypsum board or equivalent applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than a 5/8-inch Type X gypsum board or equivalent. Door openings between a private garage and the dwelling unit shall be equipped with either solid wood doors or solid or honeycomb core steel doors not less than 1 3/8 inches (34.9 mm) thick, or doors in compliance with Section 715.4.3. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Doors shall be self-closing and self-latching.
2. -3 {CBC text not modified}

406.1.5 – 406.7.4 {CBC text not modified}

SECTION 20. FMC §7-1220.508 ADDED

Sec. 7-1220.508 Amendment to 2010 CBC Section 508 (Mixed Use and Occupancy)

Section 7-1220.508 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Section 508 of the 2010 California Building Code is amended as follows:

508.1 – 508.3.2 {CBC text not modified}

508.3.3 Separation. {CBC text not modified}

Exceptions:

1. Group H-2, H-3, H-4, H-5, I-2, I-2.1 or I-3 occupancies shall be separated from all other occupancies in accordance with Section 508.3.3.
2. The requirement of garage side protection of Section 406.1.4 shall be provided between all private garages and residential occupancies.

SECTION 21. FMC §7-1220.602 ADDED

Section 7-1220.602 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.602 Amendment to 2010 CBC Section 602 (Construction Classification)

Table 602, footnote c of the 2010 California Building Code is amended as follows. All other subsections and tables within Section 602 are not modified.

- c. Except in *high-rise buildings*, Group A, E, F-1, H, I, L, M, R-1, R-2, and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. *For Group A, E, I, L, R-1, and R-2 occupancies and other applications listed in Section 111 regulated by the Office of the State Fire Marshal, fire protection of members other than the structural frame shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below.* Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.

SECTION 22. FMC §7-1220.709 ADDED

Section 7-1220.709 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.709 Amendment to 2010 CBC Section 709 (Fire Partitions)

Section 709 of the 2010 California Building Code is amended as follows:

709.1 – 709.2 {CBC text not modified}

709.3 Fire-resistance rating. {CBC text not modified}

Exceptions:

1. {CBC text not modified}

2. deleted

709.4 – 709.9 {CBC text not modified}

SECTION 23. FMC §7-1220.712 ADDED

Section 7-1220.712 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.712 Amendment to 2010 CBC Section 712 (Horizontal Assemblies)

Section 712 of the 2010 California Building Code is amended as follows:

712.1 – 712.2 {CBC text not modified}

712.3 Fire-resistance rating. {CBC text not modified}

Exception: deleted

712.3.1 -712.9 {CBC text not modified}

SECTION 24. FMC §7-1220.701A ADDED

Section 7-1220.701A is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.701A Amendment to 2010 CBC Section 701A (Scope, Purpose and Application)

Section 701A of the 2010 California Building Code is amended as follows:

701A.1 Scope: This chapter applies to building materials, systems and assemblies used in the exterior design and construction of new and existing buildings or structures erected, constructed, altered, or moved within a Wildland-Urban Interface Fire Area as defined in Section 702A.

701A.2 {CBC text not modified}

701A.3 Application. New or existing buildings or structures erected, constructed, altered, or moved within or into any Wildland-Urban Interface Fire Area, shall comply with all sections of this chapter.

Exceptions:

1. – 3. {CBC text not modified}

4. deleted.

701A.3.1 – 701A.5 {CBC text not modified}

SECTION 25. FMC §7-1220.702A ADDED

Section 7-1220.702A is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.702A Amendment to 2010 CBC Section 702A (Definitions)

Section 702A of the 2010 California Building Code is amended by modifying the following definitions. The remaining definitions are not modified.

LOCAL AGENCY VERY HIGH FIRE HAZARD SEVERITY ZONE means those areas designated by the City of Fremont as Very High Fire Hazard Severity Zones in Fremont Municipal Code Title VII, Chapter 13.

WILDLAND-URBAN INTERFACE FIRE AREA is a geographical area identified by the state as a “Fire Hazard Severity Zone” in accordance with Public Resources Code Sections 4201 through 4204 and Government Code Sections 51176 through 51189, and includes those areas designated by the City of Fremont as Very High Fire Hazard Severity Zones in Fremont Municipal Code Title VII, Chapter 13.

SECTION 26. FMC §7-1220.705A ADDED

Section 7-1220.705A is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.705A Amendment to 2010 CBC Section 705A (Roofing)

Section 705A of the 2010 California Building Code is amended as follows:

705A.1 – 705A.2 {CBC text not modified}

705A.2.1 Wildland Urban-Interface Fire Area. The roof covering of any new structure or the re-roofing of any existing building within Wildland-Urban Interface Fire Area, regardless of the type of construction or occupancy classification, shall be a fire-retardant roof covering that is at least Class A. All alteration, repair, replacement or reroofing shall conform to the applicable provisions of the 2010 California Building Code Section 1604 “Roof Design” and any other applicable engineering requirements, including Chapter 15, “Roof Construction and Covering.

705A.3 – 705A.4 {CBC text not modified}

SECTION 27. FMC §7-1220.707A ADDED

Section 7-1220.707A is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.707A Amendment to 2010 CBC Section 707A (Exterior Covering)

Section 707A of the 2010 California Building Code is amended as follows:

707A.1 – 707A.3.1 {CBC text not modified}

707A.3.1.2 Exterior wall covering. All exterior faces of the exterior walls shall be of an assembly qualified for exterior face of recognized one-hour fire resistive

assemblies. All exterior wall coverings shall meet a Class I flame spread requirement and be installed over materials approved for one-hour fire-resistive construction.

Exception: Class I flame spread requirement may be waived for additions not to exceed 50%, cumulatively over the life of the structure, of the existing structure including garage areas with 1-hour fire resistive exterior wall assembly.

707A.4 – 707A.8 {CBC text not modified}

707A.9 Utilities. Utilities, pipes, furnaces, water heaters or other mechanical devices located in an exposed under-floor area of a building or structure shall be enclosed with material as required for exterior, one-hour, fire-resistive construction. Adequate covered access opening for servicing such utilities shall be provided as required by appropriate codes.

707A.10 Historical buildings. Repairs, alterations and additions necessary for the preservation, restoration, rehabilitation or continued use of a building or structure may be made without conformance to all the requirements of this code when authorized by the Building Official, provided:

1. The building or structure conforms to Part 8, Title 24, of the California Code of Regulations; and
2. A fire protection plan is implemented so that the building or structure will be no more of a fire hazard than any new building. The plan must be prepared and signed by a registered Fire Protection Engineer. The plan must be approved by the Building Official and fire chief prior to the commencement of any work.

SECTION 28. FMC §7-1220.902 ADDED

Section 7-1220.902 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.902 Amendment to 2010 CBC Section 902 (Definitions)

Section 902 of 2010 California Building Code is amended by adding additional definitions to Section 902.1 as follows. The remaining definitions are not modified.

CURRENT CODE means the edition of the California Building Standards Code published by the International Code Council (ICC) as adopted by the City of Fremont. The edition to be applied shall be that edition in effect at the time damage occurs.

ENGINEERING EVALUATION means an evaluation of a suspected damaged building or structure, performed under the direction of a fire protection engineer, structural engineer, civil engineer or architect retained by the owner of the building or structure. Engineering evaluations shall, at a minimum, contain recommendations for repair with an appropriate estimate of the construction cost for those repairs.

ESSENTIAL SERVICE FACILITY means that building or structure which has been designated by the City Council to house facilities which are necessary for emergency operations.

FIRE PROTECTION ENGINEER means an individual registered by the State of California to practice fire protection engineering and to use the title, Fire Protection Engineer, as defined in the State of California Business and Professions Code.

HAZARDOUS FIRE AREA means the "Wildland-Urban Interface Fire Area" as defined in Section 702A as amended by the City of Fremont.

HISTORIC BUILDING OR STRUCTURE means as defined in the Section 8-201, Chapter 2, Part 8, 2010 California Historical Building Code, Title 24 of the California Codes of Regulations.

REPLACEMENT VALUE means the dollar value, as determined by the Building Official based upon the square footage and the guidelines used in establishing the valuation of new construction, for replacing the damaged structure with a new structure of the same size, construction material and occupancy on the same site.

VALUE OF REPAIR means the dollar value, as determined by the Building Official, of the necessary repairs to a damaged structure.

SECTION 29. FMC §7-1220.903 ADDED

Section 7-1220.903 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.903 Amendment to 2010 CBC Section 903 (Automatic Sprinkler System)

Section 903 of the 2010 California Building Code is amended as follows:

903.1 General. Automatic sprinkler systems shall be provided as set forth in Section 903 of the California Fire Code as adopted and amended by FMC Section 7-1720.903.

903.1.1 – 903.5 deleted

SECTION 30. FMC §7-1220.1018 ADDED

Section 7-1220.1018 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1018 Amendment to the 2010 CBC Section 1018 (Corridors)

Table 1018.1 of the 2010 California Building Code is amended by modifying the third row below the header to read as follows. The remainder of Table 1018.1 is unchanged.:

A ^d , B, F, M, S, U	Greater than 30	1	1
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SECTION 31. FMC §7-1220.1021 ADDED

Section 7-1220.1021 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1021 Amendment to the 2010 CBC Section 1021 (Number of Exits and Continuity)

Table 1021.2 of the 2010 California Building Code is amended by eliminating footnote c.

SECTION 32. FMC §7-1220.1507 ADDED

Section 7-1220.1507 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1507 Amendment to 2010 CBC Section 1507 (Requirement for Roof Covering)

Section 1507 of the 2010 California Building Code is amended as follows:

1507.1 {CBC text not modified}

1507.1.1 Certification. The installer of the roof covering shall provide certification of the roof covering classification to the building owner and to the City when roof covering installation is subject to the 2010 CBC Chapter 7A.

Exceptions:

1. The certification requirements of this Section shall not apply to any building which is subject to addition, repair, alterations, roof installation, or replacement of less than 50% of the existing building's roof area over the life of the building commencing on or after the effective date of February 15, 1991.
2. For accessory building, refer to Section 105.2, exception 1.

1507.2 – 1507.16 {CBC text not modified}

SECTION 33. FMC §7-1220.1612 ADDED

Section 7-1220.1612 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1612 Amendment to the 2010 CBC Section 1612 (Flood Loads)

Section 1612 of the 2010 California Building Code is amended as follows:

1612.1 – 1612.2 {CBC text not modified}

1612.3 Establishment of flood hazard areas. To establish flood hazard areas, the governing body shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency in an engineering report entitled “The Flood Insurance Study for City of Fremont, California, revision dated February 9, 2000, as amended, with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this Section.

Exception: {CBC text not modified}

1612.3.1. – 1612.5 {CBC text not modified}

SECTION 34. FMC §7-1220.1613 ADDED

Section 7-1220.1613 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1613 Amendment to 2010 CBC Section 1613 (Earthquake Load)

Section 1613 of the 2010 California Building Code is amended as follows:

1613.1 – 1613.6.6 {CBC text not modified}

1613.6.7 Minimum distance for building separation. {Equation 16-44 is amended as shown. All other portions of 1613.6.7 are not modified.}

$$\delta_M = \frac{C_d \delta_{\max}}{I} \quad (\text{Equation 16-44})$$

where:

C_d = Deflection amplification factor in Table 12.2-1 of ASCE 7.

δ_{\max} = Maximum displacement defined in Section 12.8.4.3 of ASCE 7.

~~I = Importance factor in accordance with Section 11.5.1 of ASCE 7.~~

1613.6.8 – 1613.7 {CBC text not modified}

1613.8 Modified ASCE 7, Table 12.8-2. ASCE 7 Table 12.8-2 is amended as follows:

Structure Type	C_t	α
Eccentrically braced steel frames <u>and buckling-restrained braced frames</u>	0.03 (0.0731) ^a	0.75

1613.9 Modified ASCE 7, 12.2.3.1, Exception 3. ASCE 7 Section 12.2.3.1 Exception 3 is amended as follows:

3. Detached one and two family dwellings up to two stories in height of light frame construction.

1613.10 Modified ASCE 7, Section 12.8.7. ASCE 7 Section 12.8.7 is amended by modifying Equation 12.8-16 as follows:

$$\theta = \frac{P_x \Delta I}{V_x h_{sx} C_d} \quad (12.8-16)$$

1613.11 Suspended Ceilings. Minimum design and installation standards for suspended ceilings shall be determined in accordance with the requirements of Section 2506.2.1 of this Code and this subsection.

1613.11.1 Scope. This part contains special requirements for suspended ceilings and lighting systems. Provisions of Section 13.5.6 of ASCE 7 shall apply except as modified herein.

1613.11.2 General. The suspended ceilings and lighting systems shall be limited to 6 feet (1828 mm) below the structural deck unless the lateral bracing is designed by a licensed engineer or architect.

1613.11.3 Design and Installation Requirements.

1613.11.3.1 Bracing at Discontinuity. Positive bracing to the structure shall be provided at changes in the ceiling plane elevation or at discontinuities in the ceiling grid system.

1613.11.3.2 Support for Appendages. Cable trays, electrical conduits and piping shall be independently supported and independently braced from the structure.

1613.11.3.3 Sprinkler Heads. All sprinkler heads (drops) except fire-resistance-rated floor/ceiling or roof/ceiling assemblies, shall be designed to allow for free movement of the sprinkler pipes with oversize rings, sleeves or adaptors through the ceiling tile, in accordance with Section 13.5.6.2.2 (e) of ASCE 7.

Sprinkler heads penetrating fire-resistance-rated floor/ceiling or roof/ceiling assemblies shall comply with Section 713 of this Code.

1613.11.3.4 Perimeter Members. A minimum wall angle size of at least a two-inch (51 mm) horizontal leg shall be used at perimeter walls and interior full height partitions. The first ceiling tile shall maintain 3/4 inch (19 mm) clear from the finish wall surface. An equivalent alternative detail that will provide sufficient movement due to anticipated lateral building displacement may be used in lieu of the long leg angle subject to the approval of the Building Official.

1613.11.4 Special Requirements for Means of Egress. Suspended ceiling assemblies located along means of egress serving an occupant load of 30 or more shall comply with the following provisions.

1613.11.4.1 General. Ceiling suspension systems shall be connected and braced with vertical hangers attached directly to the structural deck along the means of egress serving an occupant load of 30 or more and at lobbies accessory to Group A Occupancies. Spacing of vertical hangers shall not exceed 2 feet (610 mm) on center along the entire length of the suspended ceiling assembly located along the means of egress or at the lobby.

1613.11.4.2 Assembly Device. All lay-in panels shall be secured to the suspension ceiling assembly with two hold-down clips minimum for each tile within a 4-foot (1219 mm) radius of the exit lights and exit signs.

1613.11.4.3 Emergency Systems. Independent supports and braces shall be provided for light fixtures required for exit illumination. Power supply for exit illumination shall comply with the requirements of Section 1006.3 of this Code.

1613.11.4.4 Supports for Appendage. Separate support from the structural deck shall be provided for all appendages such as light fixtures, air diffusers, exit signs, and similar elements.

SECTION 35. FMC §7-1220.1704 ADDED

Section 7-1220.1704 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1704 Amendment to 2010 CBC Section 1704 (Special Inspections)

Section 1704 of the 2010 California Building Code is amended as follows:

1704.1 – 1704.3.4 {CBC text not modified}

1704.4 Concrete Construction. The special inspections and verifications for concrete construction shall be as required by this section and Table 1704.4.

Exceptions: Special inspection shall not be required for:

1. Isolated spread concrete footings of buildings three stories or less above grade plane that are fully supported on earth or rock, where the structural design of the footing is based on a specified compressive strength, f'_c , no greater than 2,500 pounds per square inch (psi) (17.2 Mpa).
2. Continuous concrete footings supporting walls of buildings three stories or less in height that are fully supported on earth or rock where:
 - 2.1. The footings support walls of light-frame construction;

- 2.2. The footings are designed in accordance with Table 1809.7; or
- 2.3. The structural design of the footing is based on a specified compressive strength, f'_c , no greater than 2,500 pounds per square inch (psi) (17.2 Mpa), regardless of the compressive strength specified in the construction documents or used in the footing construction.
3. Nonstructural concrete slabs supported directly on the ground, including prestressed slabs on grade, where the effective prestress in the concrete is less than 150 psi (1.03 Mpa).
4. deleted
5. Concrete patios, driveways and sidewalks, on grade.

1704.4.1 – 1704.7 {CBC text not modified}

1704.8 Driven deep foundations and connecting grade beams. Special inspections shall be performed during installation and testing of driven deep foundation elements as required by Table 1704.8. *Special inspections shall be performed for connection grade beams in accordance with Section 1704.4 for structures assigned to Seismic Design Category D, E or F.* The approved geotechnical report, and the construction documents prepared by the registered design professionals, shall be used to determine compliance.

1704.9 Cast-in-place deep foundations and connecting grade beams. Special inspections shall be performed during installation and testing of cast-in-place deep foundation elements as required by Table 1704.9. *Special inspections shall be performed for connection grade beams in accordance with Section 1704.4 for structures assigned to Seismic Design Category D, E or F.* The approved geotechnical report, and the construction documents prepared by the registered design professionals, shall be used to determine compliance.

1704.10 – 1704.16.2 {CBC text not modified}

SECTION 36. FMC §7-1220.1710 ADDED

Section 7-1220.1710 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1710 Amendment to 2010 CBC Section 1710 (Structural Observations)

Section 1710 of the 2010 California Building Code is amended as follows:

1710.1 {CBC text not modified}

1710.2 Structural observations for seismic resistance. {CBC text not modified}

1. – 5. {CBC text not modified}

6. Structural observations of the lateral system shall be provided for all new commercial, industrial, and multifamily buildings and all new single family dwelling on hillsides.

Exception: Structural observations of the lateral system may be waived for one and two-story wood residential structures when such structures are in full compliance with conventional design of Chapter 23 of the California Building Code.

1710.3 {CBC text not modified}

SECTION 37. FMC §7-1220.1803 ADDED

Section 7-1220.1803 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1803 Amendment to 2010 CBC Section 1803 (Geotechnical Investigations)

Section 1803 of the 2010 California Building Code is amended as follows:

1803.1 – 1803.1.1.3 {CBC text not modified}

1803.2 Investigations required. {CBC text not modified}

Exceptions. The following occupancies are exempt:

1. Group U occupancies;
2. Single story additions to existing Group R3 occupancies when total added floor area is less than 1,000 square feet and the building site is not within seismic induced landslide hazard zone.
3. Multi-story addition to existing single family dwelling (R3) occupancies when all of the following conditions are met:
 - a. Added floor area above the first floor is no more than 1,000 square feet,
 - b. When an Architect, Civil or Structural engineer registered in the State of California provides the structural design,
 - c. The Architect or Engineer of Record shall certify in writing that the new foundation matches existing foundation,
 - d. Building site is not within seismic induced landslide hazard zone.

4. A new soil report is not required when a soil report is available for the original construction of the existing structure and soil engineer allows extension of the existing report to the proposed addition construction.
5. Accessories and minor additions may be exempted by the Building Official.

1803.3 – 1803.5.12 {CBC text not modified}

1803.6 Reporting. {CBC text not modified}

1. – 11. {CBC text not modified}
12. Drainage and erosion control recommendations.
13. Minimum building setbacks to slope tops or toes.
14. Equivalent-fluid-density lateral loads used in design of retaining walls or basement walls.
15. Ground response evaluation by geologist licensed in California for:
 - a. Flexible structures located on site having soft to medium cohesion less soils in upper 50 feet and depth to bedrock is 400 feet or greater; and
 - b. Structures having irregular shapes, framing systems, or other unusual features as determined by the Building Official.
16. Liquefaction evaluation for the following uses:
 - a. Subdivisions of Group R-3 occupancy having 100 units or more;
 - b. Apartment or condominium complexes of Group R- I occupancy having 50 or more units;
 - c. Structure of four or more stories or over 35 feet high;
 - d. Commercial, industrial, and institutional projects having 250 occupants or more;
 - e. Essential facilities.
17. Slope stability evaluation in areas subject to localized or major landslides.
18. Surface rupture evaluation by geologist licensed in California for all projects for human occupancy located with a Geologic Hazards Special Studies Zone, as mapped by the California Division of Mines and Geology.
19. Soil corrosivity analysis and long-term corrosion control design recommendations.

1803.7 – 1803.7.2 {CBC text not modified}

1803.8 Review. Before issuing a permit for a building where soil and foundation investigation is required, the Geotechnical Engineer or Civil Engineer who prepared the soil investigation shall state in writing (must be signed and stamped):

1. The plans and specifications substantially conform to the recommendations in the soil investigation.
2. The Geotechnical Engineer or Civil Engineer who prepared the soil investigation has been retained to provide soil site observation and provide periodic and final reports to the city.

1803.9 Field Report. Before requesting a foundation inspection from the City, the Geotechnical Engineer or Civil Engineer who prepared the soil investigation shall provide a written field report stating:

1. The building pad was prepared and compacted in accordance with the soil report and specification.
2. The foundation or pier excavation, depth, backfill materials, and drainage (if applicable), substantially conforms with the soil report and approved plans.

1803.10 Final Report. Before final inspection for any building or structure, the Geotechnical Engineer or Civil Engineer who prepared the soil investigation shall issue a final report stating the completed pad, foundation, finish grading, drainage, and associated site work substantially conforms to the approved plans, specifications, and investigation.

SECTION 38. FMC §7-1220.1804 ADDED

Section 7-1220.1804 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1804 Amendment to 2010 CBC Section 1804 (Excavation, Grading and Fill)

Section 1804 of the 2010 California Building Code is amended as follows:

1804.1 – 1804.3 {CBC text not modified}

1804.3.1 Slopes for permanent fills shall not be steeper than 3 horizontal to 1 vertical. Cut slopes for permanent excavations shall not be steeper than 3 horizontal to 1 vertical unless substantiating data justifying steeper cut slopes is submitted. Deviation from the foregoing limitations for cut slopes shall be permitted only upon the presentation of a soils report acceptable to the Building Official. All site improvements shall be designed and constructed in accordance with the recommendations contained in the soil report.

1804.3.2 Where cuts or fills are to be made as described above, pad elevation certification(s) will be required prior to foundation inspection. Required certification shall be made by a licensed Land surveyor or registered civil engineer in the State of California.

1804.4 – 1804.6 {CBC text not modified}

SECTION 39. FMC §7-1220.1807 ADDED

Section 7-1220.1807 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1807 Amendment to 2010 CBC Section 1807 (Foundation Walls, Retaining Walls and Embedded Posts and Poles)

Section 1807 of the 2010 California Building Code is amended as follows:

1807.1 – 1807.1.5 {CBC text not modified}

1807.1.6 Prescriptive design of concrete and masonry foundation walls. Concrete and masonry foundation walls that are laterally supported at the top and bottom shall be permitted to be designed and constructed in accordance with this section.

Prescriptive design of foundation walls shall not be used for structures assigned to Seismic Design Category D, E or F.

1807.1.6.1 {CBC text not modified}

SECTION 40. FMC §7-1220.1908 ADDED

Section 7-1220.1908 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1908 Amendment to 2010 CBC Section 1908 (Modifications to ACI 318)

Section 1908 of the 2010 California Building Code is amended as follows:

1908.1 {CBC text not modified}

1908.1.2 ACI 318, Section 21.1.1. {CBC text not modified}

21.1.1.3 {CBC/ACI text not modified}

21.1.1.4 {CBC/ACI text not modified}

21.1.1.7 {CBC/ACI text not modified}

(a) – (g) {CBC/ACI text not modified}

(h) All special moment frames and special structural walls shall also satisfy 21.1.3 through 21.1.7. Concrete tilt-up wall panels classified as intermediate precast structural wall systems shall satisfy 21.9 in addition to 21.4.2 and 21.4.3 for structures assigned to Seismic Design Category D, E or F.

1908.1.3 – 1908.1.7 {CBC text not modified}

1908.1.8 ACI 318, Section 22.10. Delete ACI 318, Section 22.10, and replace with the following:

22.10 – Plain concrete in structures assigned to Seismic Design Category C, D, E or F.

22.10.1 – Structures assigned to Seismic Design Category C, D, E or F shall not have elements of structural plain concrete, except as follows:

- (a) Structural plain concrete basement, foundation or other walls below the base are permitted in detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls. In dwellings assigned to Seismic Design Category D or E, the height of the wall shall not exceed 8 feet (2438 mm), the thickness shall not be less than 7½ inches (190 mm), and the wall shall retain no more than 4 feet (1219 mm) of unbalanced fill. Walls shall have reinforcement in accordance with 22.6.6.5. Concrete used for fill with a minimum cement content of two (2) sacks of Portland cement per cubic yard.
- (b) Isolated footings of plain concrete supporting pedestals or columns are permitted, provided the projection of the footing beyond the face of the supported member does not exceed the footing thickness.

~~Exception: In detached one- and two-family dwellings three stories or less in height, the projection of the footing beyond the face of the supported member is permitted to exceed the footing thickness.~~

- (c) Plain concrete footings supporting walls are permitted provided the footings have at least two continuous longitudinal reinforcing bars. Bars shall not be smaller than No. 4 and shall have a total area of not less than 0.002 times the gross cross-sectional area of the footing. ~~For footings that exceed 8 inches (203 mm) in thickness, a~~ minimum of one bar shall be provided at the top and bottom of the footing. Continuity of reinforcement shall be provided at corners and intersections.

Exceptions:

- ~~1.—~~In detached one- and two-family dwellings three stories or less in height and constructed with stud-bearing walls, plain concrete footings ~~without longitudinal reinforcement supporting walls are permitted with at least two continuous longitudinal reinforcing bars not smaller than No. 4 are~~

permitted to have a total area of less than 0.002 times the gross cross-sectional area of the footing.

- ~~2. For foundation systems consisting of a plain concrete footing and a plain concrete stemwall, a minimum of one bar shall be provided at the top of the stemwall and at the bottom of the footing.~~
- ~~3. Where a slab on ground is cast monolithically with the footing, one No. 5 bar is permitted to be located at either the top of the slab or bottom of the footing.~~

1908.1.9 – 1908.1.10 {CBC text not modified}

1908.1.11 ACI 318, Section 21.6.4.1. Modify ACI 318, Section 21.6.4.1, to read as follows:

Where the calculated point of contraflexure is not within the middle half of the member clear height, provide transverse reinforcement as specified in ACI 318 Sections 21.6.4.1, Items (a) through (c), over the full height of the member.

1908.1.12 ACI 318, Section 21.6.4. Modify ACI 318, Section 21.6.4, by adding Section 21.6.4.8 to read as follows:

21.6.4.8 – At any section where the design strength, ϕP_n , of the column is less than the sum of the shears V_e computed in accordance with ACI 318 Sections 21.5.4.1 and 21.6.5.1 for all the beams framing into the column above the level under consideration, transverse reinforcement as specified in ACI 318 Sections 21.6.4.1 through 21.6.4.3 shall be provided. For beams framing into opposite sides of the column, the moment components may be assumed to be of opposite sign. For the determination of the design strength, ϕP_n , of the column, these moments may be assumed to result from the deformation of the frame in any one principal axis.

1908.1.13 ACI 318, Section 21.9.4. Modify ACI 318, Section 21.9.4, by adding Section 21.9.4.6 to read as follows:

21.9.4.6 – Walls and portions of walls with $P_u > 0.35P_o$ shall not be considered to contribute to the calculated strength of the structure for resisting earthquake-induced forces. Such walls shall conform to the requirements of ACI 318 Section 21.13.

1908.1.14 ACI 318, Section 21.11.6. Modify ACI 318, Section 21.11.6, by adding the following:

Collector and boundary elements in topping slabs placed over precast floor and roof elements shall not be less than 3 inches (76 mm) or $6 d_b$ thick, where d_b is the diameter of the largest reinforcement in the topping slab.

SECTION 41. FMC §7-1220.1909 ADDED

Section 7-1220.1909 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.1909 Amendment to 2010 CBC Section 1909 (Structural Plain Concrete)

Section 1909 of the 2010 California Building Code is amended as follows:

1909.1 -1909.3 {CBC text not modified}

1909.4 Design. Structural plain concrete walls, footings and pedestals shall be designed for adequate strength in accordance with ACI 318, Section 22.4 through 22.8.

Exception: For Group R-3 occupancies and buildings or other occupancies less than two stories above grade plane of light-frame construction, the required edge thickness of ACI 318 is permitted to be reduced to 6 inches (152 mm), provided that the footing does not extend more than 4 inches (102 mm) on either side of the supported wall. *This exception shall not apply to structural elements designed to resist seismic lateral forces for structures assigned to Seismic Design Category D, E or F.*

1909.5 – 1909.6.3 {CBC text not modified}

SECTION 42. FMC §7-1220.2204 ADDED

Section 7-1220.2204 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.2204 Amendment to 2010 CBC Section 2204 (Connections)

Section 2204 of the 2010 California Building Code is amended as follows:

2204.1 {CBC text not modified}

2204.1.1 Consumables for welding.

2204.1.1.1 Seismic force resisting system (SFRS) welds. All welds used in members and connections in the SFRS shall be made with filler metals meeting the requirements specified in AWS D1.8 Clause 6.3. AWS D1.8 Clauses 6.3.5, 6.3.6, 6.3.7 and 6.3.8 shall apply only to demand critical welds.

2204.1.1.2 Demand critical welds. Where welds are designated as demand critical, they shall be made with filler metals meeting the requirements specified in AWS D1.8 Clause 6.3.

2204.2 – 2204.2.1 {CBC text not modified}

SECTION 43. FMC §7-1220.2205 ADDED

Section 7-1220.2205 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.2205 Amendment to 2010 CBC Section 2205 (Structural Steel)

Section 2205 of the 2010 California Building Code is amended as follows:

2205.1 – 2205.3.1 {CBC text not modified}

2205.4 AISC 341, Part I, Section 13.2 Members. Add Section 13.2f to read as follows:

13.2f. Member Types. The use of rectangular HSS are not permitted for bracing members, unless filled solid with cement grout having a minimum compressive strength of 3,000 psi (20.7 MPa) at 28 days. The effects of composite action in the filled composite brace shall be considered in the sectional properties of the system where it results in the more severe loading condition or detailing.

SECTION 44. FMC §7-1220.2304 ADDED

Section 7-1220.2304 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.2304 Amendment to 2010 CBC Section 2304 (General Construction Requirements)

Section 2304 text and Table 2304.9.1 of the 2010 California Building Code are amended as follows:

2304.1 – 2304.9 {CBC text not modified}

2304.9.1 Fastener requirements. Connections for wood members shall be designed in accordance with the appropriate methodology in Section 2301.2. The number and size of fasteners connecting wood members shall not be less than that set forth in Table 2304.9.1. *Staple fasteners in Table 2304.9.1 shall not be used to resist or transfer seismic forces in structures assigned to Seismic Design Category D, E or F.*

Exception: Staples may be used to resist or transfer seismic forces when the allowable shear values are substantiated by cyclic testing and approved by the Building Official.

2304.9.1. – 2304.12 {CBC text not modified}

Table 2304.6.

Add new footnote q to Table 2304.9.1. to read as follows. The remaining portions of Table 2304.6 are not modified.

q. Staples shall not be used to resist or transfer seismic forces in structures assigned to Seismic Design Category D, E or F.

SECTION 45. FMC §7-1220.2305 ADDED

Section 7-1220.2305 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.2305 Amendment to 2010 CBC Section 2305 (General Design Requirements for Lateral-Force-Resisting Systems)

Section 2305 of the 2010 California Building Code is amended as follows:

2305.1 – 2305.3 {CBC text not modified}

2305.4 Quality of Nails. In Seismic Design Category D, E or F, mechanically driven nails used in wood structural panel shear walls shall meet the same dimensions as that required for hand-driven nails, including diameter, minimum length and minimum head diameter. Clipped head or box nails are not permitted in new construction. The allowable design value for clipped head nails in existing construction may be taken at no more than the nail-head-area ratio of that of the same size hand-driven nails.

2305.5 Hold-down connectors. In Seismic Design Category D, E or F, hold-down connectors shall be designed to resist shear wall overturning moments using approved cyclic load values or 75 percent of the allowable seismic load values that do not consider cyclic loading of the product. Connector bolts into wood framing shall require steel plate washers on the post on the opposite side of the anchorage device. Plate size shall be a minimum of 0.229 inch by 3 inches by 3 inches (5.82 mm by 76 mm by 76 mm) in size. Hold-down connectors shall be tightened to finger tight plus one half (1/2) wrench turn just prior to covering the wall framing.

SECTION 46. FMC §7-1220.2306 ADDED

Section 7-1220.2306 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.2306 Amendment to 2010 CBC Section 2306 (Allowable Stress Design)

Section 2306 of the 2010 California Building Code is amended as follows:

2306.1 – 2306.2 {CBC text not modified}

2306.2.1 Wood structural panel diaphragms. Wood structural panel diaphragms shall be designed and constructed in accordance with AF&PA SDPWS. Wood structural panel diaphragms are permitted to resist horizontal forces using the allowable shear capacities set forth in Table 2306.2.1(1) or 2306.2.1(2). The allowable shear capacities in Table 2306.2.1(1) and 2306.2.1(2) are permitted to be increased 40 percent for wind design.

Wood structural panel diaphragms fastened with staples shall not be used to resist seismic forces in structures assigned to Seismic Design Category D, E or F.

Exception: Staples may be used for wood structural panel diaphragms when the allowable shear values are substantiated by cyclic testing and approved by the Building Official.

Wood structural panel diaphragms used to resist seismic forces in structures assigned to Seismic Design Category D, E or F shall be applied directly to the framing members.

Exception: Wood structural panel diaphragm is permitted to be fastened over solid lumber planking or laminated decking, provided the panel joints and lumber planking or laminated decking joints do not coincide.

2306.2.2 – 2306.2.4 {CBC text not modified}

2306.3 Wood structural panel shear walls. Wood structural panel shear walls shall be designed and constructed in accordance with AF&PA SDPWS. Wood structural panel shear walls are permitted to resist horizontal forces using the allowable capacities set forth in Table 2306.3. Allowable capacities in Table 2306.3 are permitted to be increased 40 percent for wind design. Wood structural panel shear walls used to resist seismic forces in structures assigned to Seismic Design Category D, E or F shall not be less than 4 feet by 8 feet (1219 mm by 2438 mm), except at boundaries and at changes in framing. Wood structural panel thickness for shear walls shall not be less than 3/8 inch thick and studs shall not be spaced at more than 16 inches on center.

The maximum allowable shear value for three-ply plywood resisting seismic forces in structures assigned to Seismic Design Category D, E or F is 200 pounds per foot (2.92 kN/m). Nails shall be placed not less than 1/2 inch (12.7 mm) in from the panel edges and not less than 3/8 inch (9.5mm) from the edge of the connecting members for shear greater than 350 pounds per foot (5.11kN/m). Nails shall be placed not less than 3/8 inch (9.5 mm) from panel edges and not less than 1/4 inch (6.4 mm) from the edge of the connecting members for shears of 350 pounds per foot (5.11kN/m) or less.

Wood structural panel shear walls fastened with staples shall not be used to resist seismic forces in structures assigned to Seismic Design Category D, E or F.

Exception: Staples may be used for wood structural panel shear walls when the allowable shear values are substantiated by cyclic testing and approved by the Building Official.

Wood structural panel shear walls used to resist seismic forces in structures assigned to Seismic Design Category D, E or F shall be applied directly to the framing members.

2306.3.1 – 2306.6 {CBC text not modified}

2306.7 Shear walls sheathed with other materials.

2306.7.1 Resistance to shear (wood framing). Wood-framed walls sheathed with gypsum board shall not be used to resist wind and seismic loads. Wood-framed walls sheathed with lath and plaster constructed in accordance with Table 2306.7 may be used to resist wind and seismic loads for light-framed buildings no more than 1,600 square feet in floor area and entire structure must be single story structure.

2306.7.2 Resistance to shear (steel framing). Cold-formed steel-framed walls sheathed with gypsum board shall not be used to resist wind and seismic loads. Cold-formed steel-framed walls sheathed with lath and plaster constructed in accordance with Table 2306.7 may be used to resist wind and seismic loads for light-framed buildings no more than 1,600 square feet in floor area and entire structure must be single story structure.

SECTION 47. FMC §7-1220.2308 ADDED

Section 7-1220.2308 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.2308 Amendment to 2010 CBC Section 2308 (Conventional Light Frame Construction)

Section 2308 of the 2010 California Building Code is amended as follows:

2308.1 – 2308.12.4 {CBC text not modified}

2308.12.5 Attachment of sheathing. Fastening of braced wall panel sheathing shall not be less than that prescribed in Table 2308.12.4 or 2304.9.1. Wall sheathing shall not be attached to framing members by adhesives. *Staple fasteners in Table 2304.9.1 shall not be used to resist or transfer seismic forces in structures assigned to Seismic Design Category D, E or F.*

Exception: Staples may be used to resist or transfer seismic forces when the allowable shear values are substantiated by cyclic testing and approved by the Building Official.

All braced wall panels shall extend to the roof sheathing and shall be attached to parallel roof rafters or blocking above with framing clips (18 gauge minimum) spaced at maximum 24 inches (6096 mm) on center with four 8d nails per leg (total eight 8d nails per clip). Braced wall panels shall be laterally braced at each top corner and at maximum 24 inches (6096 mm) intervals along the top plate of discontinuous vertical framing.

2308.12.6 – 2308.12.9 {CBC text not modified}

SECTION 48. FMC §7-1220.2508 ADDED

Section 7-1220.2508 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.2508 Amendment to 2010 CBC Section 2508 (Gypsum Construction)

Section 2508 of the 2010 California Building Code is amended as follows.

2508.1 – 2508.4 {CBC text not modified}

2508.5 Horizontal gypsum board diaphragm ceilings. deleted

SECTION 49. FMC §7-1220.3401 ADDED

Section 7-1220.3401 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.3401 Amendment to 2010 CBC 3401 (General).

Section 3401 of 2010 California Building Code is amended as follows:

3401.1 Scope. {CBC text not modified}

[DSA- AC] - {CBC text not modified}

Additions, alterations or repairs to an existing building or structure which are located within the Wildland-Urban Interface Fire Area shall comply with the requirements of FBC Section 7-1220.701A.

Exceptions: {CBC text not modified}

3401.1.1 – 3401.7 {CBC text not modified}

SECTION 50. FMC §7-1220.3408 ADDED

Section 7-1220.3408 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) to read:

Sec. 7-1220.3408 Amendment to 2010 CBC 3408 (Change of Occupancy)

Section 3408 of 2010 California Building Code is amended as follows:

3408.1 – 3408.4 {CBC text not modified}

3408.4.1 AFES. When a change of occupancy results in a structure being reclassified to a higher occupancy category per table 3408.4.1, an automatic fire extinguishing system shall be installed throughout the structure.

*Table 3408.4.1

Relative Hazard	Occupancy Classifications
1 (Highest Hazard)	H
2	I-2, I-3, I-4
3	A,E, I-1,M,R-1,R-2,R-4
4	B,F-1,R-3,S-1
5 (Lowest Hazard)	F-2,S-2,U

* Ref: 2009 IEBC Table 912.4

SECTION 51. FMC §7-1223 AMENDED

Section 7-1223 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Building Code) is amended to read:

Sec. 7-1223 Supplemental Building Codes

The provisions of Fremont Municipal Code Title VII (Building Regulations), Chapter 2 (Building Security) supplement the 2010 California Building Code as adopted by this Chapter as provided in Penal Code Section 14051.

[ARTICLE 3 - FREMONT MECHANICAL CODE]

SECTION 52. FMC §7-1310 AMENDED

Section 7-1310 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) is amended to read:

Sec. 7-1310 Adoption of the 2010 CMC with Amendments.

The 2010 edition of the California Mechanical Code (CMC) as published by the International Code Council is adopted as the Mechanical Code of the City of Fremont, California, as if fully set out in this Article, and is amended as set forth in this Article. A copy of 2010 CMC shall be maintained on file in the office of the City Clerk.

SECTION 53. FMC §7-1312 AMENDED

Section 7-1312 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) is amended to read:

Sec. 7-1312 2010 CMC Appendix Chapters Adopted.

The following Appendix Chapters and Divisions of the 2010 California Mechanical Code are adopted by the City of Fremont.

- (1) Appendix A, Standard No. 2-2, 6-2, 6-5
- (2) Appendix B

(3) Appendix C

(4) Appendix D

SECTION 54. FMC §7-1314 ADDED

Section 7-1314 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) to read:

Sec. 7-1314 2010 CMC Chapter 1, Division II Adopted in Part

(a) Chapter 1, Division II of the 2010 California Mechanical Code is adopted by the City of Fremont and made a part of the Fremont Mechanical Code, except for the sections set forth in subsection (b). References to model codes in the adopted sections shall mean the corresponding California Codes as adopted by the City of Fremont.

(b) The following sections or parts of sections of Chapter 1, Division II of the 2010 California Mechanical Code are not adopted: 101.0, 102.0, 103.2, 103.4, 108.2, 108.8, 108.9, 110.0, 111.0.

SECTION 55. FMC §7-1320 AMENDED

Section 7-1320 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) is amended to read:

Sec. 7-1320 Amendments to 2010 CMC; Numbering

The 2010 California Mechanical Code is amended as provided in Sections 7-1320.112 through 7-1320.510. The number to the right of the decimal point in these sections corresponds to the section in the 2010 California Mechanical Code that is amended.

SECTION 56. FMC §7-1320.112 ADDED

Section 7-1320.112 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) to read:

Sec. 7-1320.112 Amendment of 2010 CMC Section 112 (Permits Required)

Section 112 of the 2010 California Mechanical Code is amended as follows:

112.0 - 112.1 {CMC text not modified}

112.1.1 Who may be issued a permit. Permits shall be issued only to State licensed contractors or their respective authorized representative but only to the extent and to the work the person is licensed by the State of California to do so.

Exception: Permits may be issued to owners certifying proof of exemption under the exemptions specified in California Business and Professions Code Section 7044.

112.2 -112.2.5 {CMC text not modified}

SECTION 57. FMC §7-1320.113 ADDED

Section 7-1320.113 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) to read:

Sec. 7-1320.113 Amendment of 2010 CMC Section 113 (Application for Permit)

Section 113 of the 2010 California Mechanical Code is amended as follows:

113.0 – 113.1.4 {CMC text not modified}

113.1.5. The application shall be signed by the permittee, contractor, or authorized representative of the permittee who may also be required to submit additional evidence to indicate such authority. Applicant must certify that the contents thereof are true and correct under penalty of perjury.

113.6 {CMC text not modified}

SECTION 58. FMC §7-1320.114 ADDED

Section 7-1320.114 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) to read:

Sec. 7-1320.114 Amendment of 2010 CMC Section 114 (Permit Issuance)

Section 114 of the 2010 California Mechanical Code is amended as follows:

114.0 - 114.1 {CMC text not modified}

114.1.1 Withhold permit. The Building Official may withhold the issuance of a permit if the proposed work is in conjunction with construction requiring the issuance of a building permit where no building permit has been issued.

114.2 – 114.5 {CMC text not modified}

114.6 Maintenance permit. Companies or business owners may purchase a semiannual Maintenance Permit in lieu of purchasing a permit prior to repairs or replacement of equipment. In addition, mechanical permit(s) shall be obtained for individual work being performed during each semiannual maintenance permit. All tests and inspections required by the applicable code(s) shall be performed and inspected prior to connection. An activity log describing all work performed shall be maintained on site for the periodic review by the inspector during each 180 day period.

Fees adopted by resolution of the City Council shall be paid for each semiannual Maintenance Permit at the time when such permit is issued and shall not be subject to extension as provided for in Section 114.4.

SECTION 59. FMC §7-1320.115 ADDED

Section 7-1321.115 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) to read:

Sec. 7-1320.115 Amendment of 2010 CMC Section 115 (Fees)

Sections 115 of the 2010 California Mechanical Code is amended as follows:

115.0 - 115.1 {CMC text not modified}

115.2 Permit fees. Permit fees shall be established by resolution of the City Council for any permit, inspection, review, approval, determination, or other procedure established pursuant to this Code.

115.3 Plan review fees. When a plan or other data is required to be submitted by Section 113.2 of the California Mechanical Code, a plan review fee shall be paid at the time of submitting plans and specifications for review. The plan review fees for mechanical work shall be as established by resolution of the City Council.

The plan review fees specified in this subsection are separate fees from the permit fees specified in Section 115.2 and are in addition to the permit fees.

When plans are incomplete or changed so as to require additional review, a fee shall be charged at the rate established by resolution of the City Council.

115.4 - 115.6.3 {CMC text not modified}

SECTION 60. FMC §7-1320.117 ADDED

Section 7-1320.117 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) to read:

Sec. 7-1320.117 Amendment of 2010 CMC Section 117 (Connection Approval)

Section 117 of the 2010 California Mechanical Code is amended as follows:

117.0 {CMC text not modified}

117.1 Energy connections. There shall be no clearance for connection of gas or electrical utilities until final building, electrical, plumbing, heating, air conditioning and zoning inspections are made and approval has been given on any building sought to be connected to such utilities unless approval has first been obtained from the Building Official.

117.2 {CMC text not modified}

SECTION 61. FMC §7-1320.507 ADDED

Section 7-1320.507 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) to read:

Sec. 7-1320.507 Amendment of 2010 CMC Section 507 (Commercial Hoods & Kitchen Ventilation)

507.0 – 507.2.9 { CMC text not modified}

507.2.10 Type I hoods or portions thereof penetrating a ceiling or furred space must conform to the grease duct enclosure requirements in Section 510.7.

507.2.11 Hoods less than 12 inches from a ceiling or wall shall be solidly flashed with materials of the same thickness as the hood as specified in Section 508.1.1.

507.3 – 507.4 {CMC text not modified}

SECTION 62. FMC §7-1320.510 ADDED

Section 7-1320.510 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 (Fremont Mechanical Code) to read:

Sec. 7-1320.510 Amendment of 2010 CMC Section 510 (Exhaust Duct Systems)

510.0 – 510.7 {CMC text not modified}

510.7.1 In all buildings ~~more than one story in height, and in one story buildings where the roof ceiling assembly is required to have a fire resistance rating,~~ the ducts shall be enclosed in a continuous enclosure extending from the lowest fire-rated ceiling or floor above the hood, through any concealed spaces, to or through the roof so as to maintain the integrity of the fire separations required by the applicable building code provisions. The enclosure shall be sealed around the duct at the point of penetration of the lowest fire-rated ceiling or floor above the hood in order to maintain the fire resistance rating of the enclosure and shall be vented to the exterior of the building through weather-protected openings.

Exception: {CMC text not modified}

510.7.2 – 510.9 {CMC text not modified}

SECTION 63. FMC §7-1321 Through 7-1321.117 REPEALED

Sections 7-1321, 7-1321.112, 7-1321.113, 7-1321.114, 7-13201.115, and 7-1321.117 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 3 are repealed.

[ARTICLE 4 - FREMONT PLUMBING CODE]

SECTION 64. FMC §7-1410 AMENDED

Section 7-1410 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 4 (Fremont Plumbing Code) is amended to read:

Sec. 7-1410 Adoption of the 2010 CPC With Amendments

The 2010 edition of the California Plumbing Code (CPC) as published by the International Code Council is adopted as the Plumbing Code of the City of Fremont, California, as if fully set out in this Article, and is amended as set forth in this Article. A copy of 2010 CPC shall be maintained on file in the office of the City Clerk.

SECTION 65. FMC §7-1412 AMENDED

Section 7-1412 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 4 (Fremont Plumbing Code) is amended to read:

Sec. 7-1412 2010 CPC Appendix Chapters Adopted

The following Appendix Chapters of the 2010 California Plumbing Code are adopted by the City of Fremont.

- (1) Appendix A, (Sizing Water Supply System)
- (2) Appendix B (Combination Waste and Vent System)
- (3) Appendix D (Sizing Storm Water System)
- (4) Appendix I (Installation Standard)

SECTION 66. FMC §7-1414 ADDED

Section 7-1414 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 4 (Fremont Plumbing Code) to read:

Sec. 7-1414 Adoption of Certain Portions of 2010 CPC Chapter 1, Division II

(a) Chapter 1, Division II of the 2010 California Plumbing Code is adopted by the City of Fremont and made a part of the Fremont Plumbing Code, except for the sections set forth in subsection (b). References to model codes in the adopted sections shall mean the corresponding California Codes as adopted by the City of Fremont.

(b) The following sections or parts of sections of Chapter 1, Division II of the 2010 California Plumbing Code are not adopted: 101.1, 101.2, 101.4.1.4, 101.4.3, 102.2.1, 102.2.6, 102.3, 103.7, and 103.8.

SECTION 67. FMC §7-1421 – 7-1421.413 REPEALED

Sections 7-1421, 7-1421.102, 7-1421.103, and 7-1421.413 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 4 are repealed.

SECTION 68. FMC §7-1420.102 ADDED

Section 7-1420.102 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 4 (Fremont Plumbing Code) to read:

Sec. 7-1420.102 Amendment of 2010 CPC Section 102 (Organization and Enforcement)

Section 102 of the 2010 California Plumbing Code is amended as follows.

102.0 {CPC text not modified}

102.1 Authority having jurisdiction. Whenever the term “Authority Having Jurisdiction” is used in this Article, it shall be construed to mean the Building Official or his or her authorized representative.

102.2 {CPC text not modified}

102.2.1 {not adopted}

102.2.2 – 102.2.5 {CPC text not modified}

102.2.6 {not adopted}

102.3 – 102.3.2 {not adopted}

SECTION 69. FMC §7-1420.103 ADDED

Section 7-1420.103 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 4 (Fremont Plumbing Code) to read:

Sec. 7-1420.103 Amendment of 2010 CPC Section 103 (Permits and Inspections)

Section 103 of the 2010 California Plumbing Code is amended as follows:

103.0 -103.2.1.6 {CPC text not modified}

103.2.1.7 Permits shall be issued only to contractors or their respective authorized representatives licensed by the State to perform the work authorized by the permit. Permits may be issued to owners certifying proof of exemption under Chapter 9, Division 3, Section 7044 of the State of California Business and Professions Code.

103.2.1.8 The application shall be signed by the permittee, contractor, or authorized representative of the permittee who may also be required to submit additional

evidence to indicate such authority. Applicant must certify that the contents thereof are true and correct under penalty of perjury.

103.2.2 – 103.3.1 {CPC text not modified}

103.3.1.1 The building official may withhold the issuance of a permit if the proposed work is in conjunction with construction requiring the issuance of a building permit and where no building permit has been issued.

103.3.2 – 103.3.5 {CPC text not modified}

103.3.6 Maintenance Permit. Companies or business owners may purchase a semiannual Maintenance Permit in lieu of purchasing a permit prior to repairs or replacement of equipment. In addition, plumbing permit(s) shall be obtained for individual work being performed during each semiannual maintenance permit. All tests and inspections required by the applicable code(s) shall be performed and inspected prior to connection. An activity log describing all work performed shall be maintained on site for the periodic review by the inspector during each 180 day period.

Fees provided by resolution of the City Council shall be paid for each semiannual Maintenance Permit at the time when such permit is issued and shall not be subject to extension as provided in Section 103.3.4 of the 2010 California Plumbing Code.

103.4 {CPC text not modified}

103.4.1 Permit fees. The applicant shall pay for each permit at the time of issuance a fee established by resolution of the City Council for any permit, inspection review, approval, determination or other procedure established pursuant to this Code.

103.4.2 Plan review fees. When a plan or other data is required to be submitted by Section 103.2.2 of the California Plumbing Code, a plan review fee shall be paid at the time of submitting plans and specifications for review. The plan review fees for plumbing work shall be as established by resolution of the City Council. When plans are incomplete or changed so as to require additional review, a fee shall be charged at the rate established by resolution of the City Council.

The plan review fees specified in this subsection are separate fees from the permit fees specified in Section 103.4.1 and are in addition to the permit fees.

When plans are incomplete or changed so as to require additional review, a fee shall be charged at the rate established by resolution of the City Council.

103.4.3 - 103.6.3 {CPC text not modified}

103.6.4. Clearance of connections. There shall be no clearance for connection of gas or electrical utilities until final building, electrical, plumbing, heating, air conditioning and zoning inspections are made and approval has been given on any

building or system sought to be connected to such utilities unless approval has been first obtained from the Building Official, as provided for a certificate of final inspection in Section 103.5.6.3.

103.7 – 103.8.2 {not adopted}

[ARTICLE 5. FREMONT ELECTRICAL CODE]

SECTION 70. FMC §7-1510 AMENDED

Section 7-1510 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 5 (Fremont Electrical Code) is amended to read:

Sec. 7-1510 Adoption of the 2010 California Electrical Code without amendments.

The 2010 edition of the California Electrical Code as published by the International Code Council is adopted as the Electrical Code of the City of Fremont, California, as if fully set out in this Article, and is amended as set forth in this Article. A copy of 2010 CEC shall be maintained on file in the office of the City Clerk.

[ARTICLE 6. FREMONT EXISTING BUILDING CODE]

SECTION 71. FMC §7-1610 AMENDED

Section 7-1610 of Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 6 (Fremont Existing Building Code) is amended to read:

Sec. 7-1610 Adoption of the 2010 California Existing Building Code Without Amendments.

The 2010 edition of the California Existing Building Code (CEBC) as published by the International Code Council is adopted as the Existing Building Code of the City of Fremont, California, as if fully set out in this Article, and is amended as set forth in this Article. A copy of 2010 CEBC shall be maintained on file in the office of the City Clerk.

SECTION 72. FMC §7-3113 ADDED

Section 7-3113 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 3 (Fremont Housing Code) to read:

Sec. 7-3113 Amendments to the 1997 edition of the Uniform Housing Code to Conform to the 2010 California Building Standards Code

The text of the 1997 Edition of the Uniform Housing Code, as adopted and amended by Section 7-3112, is further amended to conform to the 2010 California Building Standards Code as follows.

- (a) The reference to “Section 106 of the Building Code” in Section 301 is changed to

“the Building Code”.

- (b) The reference to “Section 107 of the Building Code” in Section 302 is changed to “the Building Code”.
- (c) The reference to “Sections 108 and 1701 of the Building Code” in Section 303 is changed to “the Building Code”.
- (d) The definition of “Building Code” in Section 401 is amended to read:

BUILDING CODE is the 2010 California Building Code as adopted and amended by the City of Fremont.

- (e) The definition of “Mechanical Code” in Section 401 is amended to read:

MECHANICAL CODE is the 2010 California Mechanical Code as adopted and amended by the City of Fremont.

- (f) The definition of “Plumbing Code” in Section 401 is amended to read:

PLUMBING CODE is the 2010 California Plumbing Code as adopted and amended by the City of Fremont.

- (g) [text unchanged]

- (h) [text unchanged]

- (i) The reference to “Section 102 of the Building Code” in Section 1001 is changed to “the Building Code”.

SECTION 73. **FMC §7-4113 ADDED**

Section 7-4113 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 3 (Fremont Housing Code) to read:

Sec. 7-4113 Amendments to the 1997 Edition of the Uniform Code For Abatement of Dangerous Buildings to Conform to the 2010 California Building Standards Code.

The text of the 1997 Edition of the Uniform Code For Abatement of Dangerous Buildings, as adopted and amended by Section 7-4112, is further amended to conform to the 2010 California Building Standards Code as follows.

- (a) The reference to “Section 3403” of the Building Code in Section 103 is changed to “Section 3401.2.”
- (b) The reference to “Sections 108 and 1701 of the Building Code” in Section 204 is changed to “the Building Code”.

(c) The definition of "Building Code" in Section 301 is changed to read as follows:

BUILDING CODE is the 2010 California Building Code as adopted and amended by the City of Fremont.

[ARTICLE 8 FREMONT RESIDENTIAL CODE]

SECTION 74. ARTICLE 8 ADDED TO TITLE VII, CHAPTER 1

Article 8 titled "Fremont Residential Code" is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code).

SECTION 75. FMC §7-1810 ADDED

Section 7-1810 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1810 Adoption of the 2010 CRC with Amendments.

The 2010 edition of the California Residential Code (CRC) as published by the International Code Council is adopted with amendments as the Residential Code of the City of Fremont, California, as if fully set out in this Article, and is amended as set forth in this Article. A copy of 2010 CRC shall be maintained on file in the office of the City Clerk.

SECTION 76. FMC §7-1812 ADDED

Section 7-1812 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1812 Adoption of Certain 2010 CRC Appendix Chapters

The following Appendix Chapters of the 2010 California Building Code are adopted by the City of Fremont. The remaining Appendix Chapters are not adopted.

- (1) Appendix Chapter G (Swimming Pools, Spas & Hot Tubs)
- (2) Appendix Chapter H (Patio Covers)
- (3) Appendix Chapter K (Sound Transmission)

SECTION 77. FMC §7-1814 ADDED

Sec. 7-1814 Administration of Residential Code

(a) Chapter 1, Division II of the 2010 California Residential Code is not adopted.

(b) Chapter 1, Division II of the 2010 California Building Code as adopted by the City of Fremont in FMC Section 7-1214 and amended by Section 7-1220.104 through 7-1220.112 governs the administration of the Fremont Residential Code.

SECTION 78. FMC §7-1820 ADDED

Section 7-1820 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 2 (Fremont Residential Code) to read:

Sec. 7-1820 Amendments to 2010 CRC; Numbering

The 2010 California Residential Code is amended as provided in Sections 7-1820.R105 through 7-1820.R113. The number to the right of the decimal point in these sections corresponds to the section in the 2010 California Residential Code amended by the City of Fremont.

SECTION 79. FMC §7-1830.R302 ADDED

Section 7-1820.R302 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 3 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R302 Amendment of 2010 CBC Section R302 (Fire-Resistant Construction).

Section R302 of the 2010 California Residential Code is amended as follows:

R302.1 – 302.2.4 {CRC text not modified}

R302.3 Two-family dwellings {CRC text not modified}

Exceptions:

1. deleted.
2. {CRC text not modified}

R302.3.1 – R302.5 {CRC text not modified}

R302.5.1 Opening protection. {CRC text not modified}

Exception: deleted

Table R302.6 is amended as follows:

TABLE R302.6
DWELLING/GARAGE AND/OR CARPORT SEPARATION

SEPARATION	MATERIAL
From the residence and attics	Not less than 5/8-inch Type X gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage <i>or</i> carport	Not less than 5/8-inch Type X gypsum board or equivalent

Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than 5/8-inch Type X gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than 5/8-inch Type X gypsum board or equivalent applied to the interior side of exterior walls that are within this area

SECTION 80. FMC §7-1820.R313 ADDED

Section 7-1820.R313 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R313 Amendment to 2010 CRC Section R313 (Automatic Fire Sprinkler Systems)

Section R313 of the 2010 California Residential Code is amended as follows:

R313.1 General. Automatic sprinkler systems shall be provided as set forth in Section 903 of the California Fire Code as adopted and amended by FMC Section 7-1720.903.

R313.1.1 – R313.3.8.2 deleted

SECTION 81. FMC §7-1820.R322 ADDED

Section 7-1820.R322 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R322 Amendment to 2010 CRC Section R322 (Flood-Resistant Construction)

Section R322 of the 2010 California Residential Code is amended as follows:

R322.1 – R322.1.3 {CRC text not modified}

R322.1.4 Establishing the design flood elevation. See FMC Section 7-1220.1612 for design flood elevation.

R322.1.5 – R322.3.6 {CRC text not modified}

SECTION 82. FMC §7-1820.R327 ADDED

Section 7-1820.R327 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R327 Amendment to 2010 CRC Section R327 (Materials and Construction Methods for Exterior Wildfire Exposure)

Section R327 of the 2010 California Residential Code is deleted. For structures exposed to exterior wildfire, California Building Code Chapter 7A with amendments in FMC Section 7-1220.701A, 7-1220.702A, 7-1220.705A, and 7-1220.707A applies.

SECTION 83. FMC §7-1820.R401 ADDED

Section 7-1820.R401 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R401 Amendment to 2010 CRC Section R401 (General)

Section R401 of the 2010 California Residential Code is amended as follows:

R401.1 – R401.3 {CRC text not modified}

R401.4 Soils tests. For establishing soil tests, see FMC Section 7-1220.1803.

R401.4.1 – R401.4.2 deleted

Table R401.4.1 deleted

SECTION 84. FMC §7-1820.R404

Section 7-1820.R404 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R404 Amendment to 2010 CRC Section R404 (Foundation and Retaining Walls)

Section R404 of the 2010 California Residential Code is amended as follows:

R404.1 – R404.1.8 {CRC text not modified}

R404.2 Wood foundation walls. Wood foundation walls shall be constructed in accordance with the provisions of Sections R404.2.1 through R404.2.6 and with the details shown in Figures R403.1(2) and R403.2(3). *Wood foundation walls shall not be used for structures located in Seismic Design Category D₀, D₁ or D₂.*

R404.2.1 – R404.5.3 {CRC text not modified}

SECTION 85. FMC §7-1820.R602 ADDED

Section 7-1820.R602 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R602 Amendment to 2010 CRC Section R602 (Wood Wall Framing)

Section R602 of the 2010 California Residential Code is amended as follows:

Table R602.10.1.2(1)

Footnote j. is added to Table R602.10.1.2(1) of the 2010 California Residential Code to read as follows. The remaining portions of Table R602.10.1.2(1) are not modified.

j. Bracing methods LIB, GB and PCP are not permitted.

Table R602.10.1.2(2)

Footnote d. is added to Table R602.10.1.2(2) of the 2010 California Residential Code to read as follow. The remaining portions of Table R602.10.1.2(2) are not modified.

d. Bracing methods LIB, GB and PCP are not permitted.

Table R602.10.2

Footnote a. is added to Table R602.10.2 of the 2010 California Residential Code to read as follows. The remaining portions of Table R602.10.2 are not modified.

a. Bracing methods LIB, GB and PCP are not permitted.

SECTION 86. FMC §7-1820.R606 ADDED

Section 7-1820.R606 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R606 Amendment to 2010 CRC Section R606 (General Masonry Construction)

Section R606 of the 2010 California Residential Code is amended as follows:

R606.1 – R606.12.2.2.2 {CRC text not modified}

R606.12.2.2.3 Reinforcement of requirements for masonry elements. Masonry elements listed in Section R606.12.2.2 shall be reinforced in either the horizontal or vertical direction as shown in Figure ~~R606.11(2)~~R606.11(3) and in accordance with the following:

1. Horizontal reinforcement. Horizontal joint reinforcement shall consist of at least two longitudinal ~~W1.7 wires spaced not more than 16 inches (406 mm) for walls greater than 4 inches (102 mm) in width and at least one longitudinal W1.7 wire spaced not more than 16 inches (406 mm) for walls not exceeding 4 inches (102 mm) in width; or~~ at least one No. 4 bar spaced not more than 48 inches (1219 mm). ~~Where two longitudinal wires of joint reinforcement are used, the space between these wires shall be the widest that the mortar joint~~

~~will accommodate.~~ Horizontal reinforcement shall be provided within 16 inches (406 mm) of the top and bottom of these masonry elements.

2. Vertical reinforcement. Vertical reinforcement shall consist of at least one No. 4 bar spaced not more than 48 inches (1219 mm). Vertical reinforcement shall be within ~~16~~8 inches (406mm) of the ends of masonry walls.

SECTION 87. FMC §7-1820.R802 ADDED

Section 7-1820.R802 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 8 (Fremont Residential Code) to read:

Sec. 7-1820.R802 Amendment to 2010 CRC Section R802 (Wood Roof Framing)

Section R802 of the 2010 California Residential Code is amended as follows:

R802.1 – R802.10.1 {CBC text not modified}

R802.10.2 Design. Wood trusses shall be designed in accordance with accepted engineering practice. The design and manufacture of metal-plate-connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional ~~where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.~~

R802.10.2.1 Applicable limits. deleted

R802.10.3 - R802.11.1 {CRC text not modified}

[ARTICLE 9 FREMONT GREEN BUILDING CODE]

SECTION 88. ARTICLE 9 ADDED TO TITLE VII, CHAPTER 1

Article 9 titled “Fremont Green Building Code” is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code).

SECTION 89. FMC §7-1910 ADDED

Section 7-1910 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 9 (Fremont Green Building Code) to read:

Sec. 7-1910 Adoption of the 2010 CGBC with Amendments.

The 2010 edition of the California Green Building Code (CGBC) as published by the International Code Council is adopted with amendments as the Green Building Code of the City of Fremont, California, as if fully set out in this Article, and is amended as set forth in this Article. A copy of 2010 CGBC shall be maintained on file in the office of the City Clerk.

SECTION 90. FMC §7-1920 ADDED

Section 7-1920 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 9 (Fremont Green Building Code) to read:

Sec. 7-1920 Amendments to 2010 CGBC; Numbering

The 2010 California Green Building Code is amended as provided in Sections 7-1920.101 through 7-1920.304. The number to the right of the decimal point in these sections corresponds to the section in the 2010 California Green Building Code amended by the City of Fremont.

SECTION 91. FMC §7-1920.101 ADDED

Section 7-1920.101 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 9 (Fremont Green Building Code) to read:

Sec. 7-1920.101 Amendment to 2010 CGBC Section 101.10 (Mandatory Requirements)

Section 101 of the 2010 California Green Building Code is amended as follows:

101.1 – 101.9 {CGBC text not modified}

101.10 Mandatory requirements. This code contains both mandatory and voluntary green building measures. Mandatory and voluntary measures are identified in the appropriate application checklist contained in this code. Additional local mandatory measures are identified in Section A4.601.1.1.

101.11 {CGBC text not modified}

SECTION 92. FMC §7-1920.202 ADDED

Section 7-1920.202 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 9 (Fremont Green Building Code) to read:

Sec. 7-1920.202 Amendment to 2010 CGBC Section 202 (Definitions)

Section 202 of the 2010 California Green Building Code is amended by modifying the definition of Low-Rise Residential Building and added a definition for Sustainability as follows. The remaining portions of Section 202 are not modified.

LOW-RISE RESIDENTIAL BUILDING. A building that is of Occupancy Group R and is ~~three~~ six stories or less, or that is a one- or two-family dwelling or townhouse.

SUSTAINABILITY. *Consideration of present development and construction impacts on the community, the economy, and the environment without compromising the needs of the future.*

SECTION 93. FMC §7-1920.4.304 ADDED

Section 7-1920.4.304 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 9 (Fremont Green Building Code) to read:

Sec. 7-1920.4.304 Amendment to 2010 CGBC Section 4.304 (Outdoor Water Use)

Section 4.304 of the 2010 California Green Building Code is amended as follows:

4.304.1 Irrigation controllers. Automatic irrigation system controllers for landscaping provided ~~by the builder~~ and installed at the time of final inspection and shall comply with the following:

1. Controllers shall be weather- or soil moisture-based controllers that automatically adjust irrigation in response to changes in plants' needs as weather conditions change.
2. Weather-based controllers without integral rain sensors or communication systems that account for local rainfall shall have a separate wired or wireless rain sensor which connects or communicates with the controller(s). Soil moisture-based controllers are not required to have rain sensor input.

Note: {CGBC text not modified}

SECTION 94. FMC §7-1920.A4.601 ADDED

Section 7-1920.A4.601 is added to Fremont Municipal Code Title VII (Building Regulations), Chapter 1 (Fremont Building Standards Code), Article 9 (Fremont Green Building Code) to read:

Sec. 7-1920.A4.601 Amendment to 2010 CGBC Section A4.601 (General)

Section A4.601 of the 2010 California Green Building Code is amended as follows:

A4.601.1 {CGBC text not modified}

A4.601.1.1 Local mandatory measures. The Tier 1 measures in Appendix A4 are mandatory for new low-rise residential buildings.

Exception: Appendix A4, Tier 1 is not mandatory for new low-rise residential projects that meets the minimum point requirements in each category and scores at least 50 points on either the Single Family or Multifamily GreenPoint Rated Checklist (<http://www.builditgreen.org/guidelines--checklists/>), published by www.greenpointrated.org (<http://www.greenpointrated.org/>) and as verified by a Certified GreenPoint Rater (<http://www.builditgreen.org/greenpoint-rated/find-rater/>).

A4.601.2 – {CGBC text not modified}

SECTION 95. EFFECTIVE DATE

This ordinance shall take effect and be enforced beginning on January 1, 2011.

SECTION 96. CEQA

The City Council finds under Title 14 of the California Code of Regulations, Section 15061(b)(3), that this ordinance is exempt from the requirements of the California Environmental Quality Act (CEQA) in that it is not a Project which has the potential for causing a significant effect on the environment. The Council therefore directs that a Notice of Exemption be filed with the Alameda County Clerk in accordance with the CEQA Guidelines.

SECTION 97. SEVERABILITY

If any section, subsection, sentence, clause or phrase of this ordinance is for any reason held by a court of competent jurisdiction to be invalid, such a decision shall not affect the validity of the remaining portions of this ordinance. Such section, subsection, sentence, clause or phrase, instead, shall be superseded and replaced by the corresponding provisions, if any exist, of Title 24 of the California Code of Regulations. The City Council of the City of Fremont hereby declares that it would have passed this ordinance and each section or subsection, sentence, clause and phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses or phrases be declared invalid.

SECTION 98. PUBLICATION OF SUMMARY

The City Clerk has caused to be published a summary of this ordinance, prepared by the City Attorney under Government Code Section 36933(c), once in *The Tri-City Voice*, a newspaper of general circulation printed and published in Alameda County and circulated in the City of Fremont, at least five days before the date of adoption. A certified copy of the full text of the ordinance was posted in the office of the City Clerk since at least five days before this date of adoption. Within 15 days after adoption of this ordinance, the City Clerk shall cause to be again published in *The Tri-City Voice* the summary of this ordinance with the names of those City Council members voting for and against the ordinance; and the City Clerk shall post in the office of the City Clerk a certified copy of the full text of this adopted ordinance with the names of those City Council members voting for and against the ordinance.

* * * * *

The foregoing ordinance was introduced before the City Council of the City of Fremont, County of Alameda, State of California, at the regular meeting of the City Council, held on the 26th day of October, 2010 and finally adopted at a regular meeting of the City Council held on the 23rd day of November, 2010 by the following vote, to wit:

AYES: Mayor Wasserman, Vice Mayor Chan, Councilmembers
Wieckowski, Natarajan and Harrison

NOES: None

ABSENT: None

ABSTAIN: None

Bob Wasserman
Mayor

ATTEST:

Dawn G. Abrahamson
City Clerk

APPROVED AS TO FORM:

[Signature]
Senior Deputy City Attorney

I HEREBY CERTIFY THAT THE ABOVE
IS A TRUE AND CORRECT COPY OF
A DOCUMENT IN THE FILES OF THE
CITY OF FREMONT

Dawn G. Abrahamson
DAWN G. ABRAHAMSON
CITY CLERK

DATE: 12/1/10

RESOLUTION NO. 2010-66

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF FREMONT, CALIFORNIA, MAKING EXPRESS FINDINGS THAT MODIFICATIONS TO THE 2010 CALIFORNIA BUILDING STANDARDS CODE ARE REASONABLY NECESSARY DUE TO LOCAL CONDITIONS

WHEREAS, on October 26, 2010, the City Council introduced Ordinances 23-2010 and 24-2010 adopting and amending the 2010 California Building Standards Code;

WHEREAS, California Health and Safety Code Sections 17958, 17958.5, 17958.7, and 18941.5 authorize the City to modify the building standards contained in the California Building Standards Code and other regulations adopted under Health and Safety Code Section 17922 if found by the City to be reasonably necessary because of local climatic, geologic, or topographic conditions; and,

WHEREAS, the City Council has considered the October 26, 2010 staff report discussing the proposed amendments to the 2010 California Building Standards Code and the presentations by staff, has considered the proposed ordinances containing the amendments attached to the report, has considered the November 23, 2010 staff report discussing the proposed findings and has reviewed the proposed findings attached to the report, and has held public hearings to receive input from the community on October 26, 2010 and November 23, 2010;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF FREMONT HEREBY RESOLVES AS FOLLOWS:

SECTION 1. Reasonably Necessary Amendments Due to Local Conditions.

- (a) The amendments to the 2010 California Building Standards Code are found to be reasonably necessary because of local climatic, geological or topographical conditions.
- (b) The City Council finds that the conditions listed in Attachment 1 attached hereto are, in fact, local climatic, geological and topographical conditions.
- (c) The conditions listed in Attachment 1 make the amendments to the 2010 California Building Standards Code described in Attachment 1 and contained in the ordinances referenced above reasonably necessary for the reasons stated in Attachment 1 and in the October 26, 2010 and November 23, 2010 staff reports.

* * *

ADOPTED November 23rd, 2010 by the City Council of the City of Fremont by the following vote, to wit:

AYES:	Mayor Wasserman, Vice Mayor Chan, Councilmembers Wieckowski, Natarajan and Harrison
NOES:	None
ABSENT:	None
ABSTAIN:	None

Bob Wasserman
Mayor

ATTEST:

Dawn G. Abrahamson
City Clerk

APPROVED AS TO FORM:

Alan Klein
Senior Deputy City Attorney

I HEREBY CERTIFY THAT THE ABOVE
IS A TRUE AND CORRECT COPY OF
A DOCUMENT IN THE FILES OF THE
CITY OF FREMONT.

Dawn G. Abrahamson
DAWN G. ABRAHAMSON
CITY CLERK

DATE: 12/1/10

ATTACHMENT 1
to
City of Fremont Resolution 2010-66

**CITY OF FREMONT MODIFICATIONS
TO THE 2010 CALIFORNIA BUILDING STANDARDS CODE DETERMINED TO BE
REASONABLY NECESSARY BECAUSE OF LOCAL CONDITIONS**

INTRODUCTION

City of Fremont Ordinances 23-2010 and 24-2010 contain amendments, deletions and additions to the building standards contained in the 2010 California Building Code, 2010 Mechanical Code, 2010 Residential Code, 2010 Green Building Code, and the 2010 California Fire Code. These modifications are reasonably necessary because of the climatic, geologic, and topographic conditions found in the City of Fremont. In accordance with Health and Safety Code Sections 17958, 17958.5, 17958.7, and 18941.5, this document describes the climatic, geologic, and topographic conditions found in the City of Fremont and the specific modifications and the local conditions determined by the City of Fremont to make each modification to the building standards reasonably necessary.

**PART I:
LOCAL CONDITIONS**

A. Profile of The City of Fremont

The City of Fremont encompasses an area of roughly 92 square miles, with a resident population of 250,000. The physical location of the City is in the southern portion of Alameda County, with the City of Union City to the north, City of Newark to the west, City of San Jose and City of Milpitas to the south and the unincorporated areas of Alameda County to the east.

The City of Fremont has a large supply of diverse and high quality housing units, and a wide range of industries including a variety of high technology, alternative energy, and life science firms, a vehicle assembly plant, warehousing and distribution businesses, and a central business district with several million square feet of office, retail, and medical facilities.

The balance of developed and undeveloped open lands has been a goal of the City of Fremont and is reflected in the steep forested ridges and foothills to the northeast, bay lands to the west, and some remaining ranchlands and open spaces to the south and east.

Winding through the City of Fremont are two major interstate highways; Interstate 880, known as the Nimitz Freeway, and Interstate 680, known as the Sinclair Freeway. The Union Pacific and Bay Area Rapid Transit railroad tracks also wind through the City of Fremont.

B. Local Conditions Create Potential For Major Fires And Earthquakes

The climatic, geologic, and topographic conditions found in the City of Fremont create a heightened risk of large loss fires and damaging earthquakes, making changes and modifications to the 2010 California Building Code, 2010 Mechanical Code, 2010 Green Building Code, 2010 Residential Code and the 2010 California Fire Code reasonably necessary in order to provide a reasonable degree of fire and life safety in this community. These conditions are discussed in detail below.

1. Climatic conditions

a. *Precipitation.* The weather patterns within the City of Fremont are moderately affected by the Pacific Ocean and the San Francisco Bay, which extends the seasonal growing patterns of the vegetation. The normal annual precipitation ranges from eight to thirty inches (8" to 30") per year with an average of approximately fifteen inches (15") per year. Ninety percent (90%) falls during the months of November through April, and ten percent (10%) from May through October. The City of Fremont has experienced a major drought in the past and it is likely that the pattern will continue in the future. Drought conditions create more frequent and larger fire incidents, especially wild fire events in the hill areas of the City. Drought conditions also place a higher demand on potable and irrigation water demand that if not managed will exceed the available supply.

b. *Relative Humidity.* Humidity generally ranges from 60% during daytime to 80% at night. Humidity can frequently drop to 40% during the summer months and occasionally drops lower.

c. *Fog.* Radiation fog from the Central Valley enters the Bay Area through the Carquinez Strait during wintertime offshore flow. It can also spill into the Fremont area over the Sunol Pass from the Livermore Valley. Dense fog can develop overnight when these conditions include a moist lower layer (i.e. following recent rain), clear skies and calm winds. Dense fog is not very common, but can have a great impact upon transportation because of reduced visibility.

d. *Temperatures.* Temperatures have been recorded as high as 109°F. Average summer highs are in the 80°F range.

e. *Winds.* Prevailing winds are from the west or northwest. However, winds are experienced from virtually every direction at one time or another. Velocities are generally in the 8 mph to 10 mph range, gusting to 25 to 35 mph, particularly during the summer months. Extreme winds, up to 85 mph, have been known to occur.

Analysis. These local climatic conditions affect the acceleration, intensity, and size of fires in the community and increase the demand for electric power and potable and irrigation water that if not effectively managed could exceed available supply. The dry winds result in increased demand for emergency response by the Fire Department by drying the fuel load and increasing the risk of ignition, and by spreading fire more rapidly and across a broader area. The winds can have a tremendous impact upon wildland fires, wood shake and shingle roof fires and fires involving the interiors of buildings. In building fires, winds can force fires back into the

building and create a blow torch effect, while preventing "natural" ventilation and cross-ventilation efforts. In developed areas of the City, fires can occur in buildings, rubbish, vehicles, and vegetation on vacant lots. In undeveloped and hillside areas of the City, there is a risk of large vegetation fires. Times of little or no rainfall, combined with low humidity and high temperatures, create extremely hazardous conditions, particularly as they relate to wood shake and shingle roof fires and conflagrations. If a fire occurs, local dry conditions combined with high winds create the risk of potential fire storms. At other times, reduced visibility and traffic accidents due to dense fog can increase demand on emergency services and increase emergency response time.

In addition, local residential development has been occurring in hillside areas adjacent to the historically designated hazardous fire area. These developments increase the chance of wild fire, while simultaneously being located further from fire stations, delaying critical response times.

2. Geological or topographical conditions

a. *Seismic Hazard.* A table from a 1998 Association of Bay Area Governments publication shows that the southern section of the Hayward Fault is slipping at a rate of 9 mm/year and is capable of generating an earthquake with a moment magnitude of 7.0. As of September 1998, the southern section of the Hayward Fault was identified as having a 23% possibility of generating a major earthquake in the next 30 years.¹ Fremont is a narrow and long city. The Hayward Fault traverses the City in a longitudinal direction; consequently, most sites in the City will be subject to a near-fault effect, and can expect significant damage or collapse of buildings. Secondary impacts could include ruptured gas lines, collapsed power lines, and breaks in the water distribution system.

The proximity of the northern segment of the Hayward Fault must also be taken into consideration. The northern segment has been estimated to be capable of generating a magnitude 7.1 earthquake with a 28% possibility of an occurrence in the next 30 years. Due to proximity and directivity effects² and shaking amplification,³ a major earthquake on the northern segment of the Hayward Fault can be anticipated to cause substantial damage in Fremont.

The combined probability of damage to buildings in the City of Fremont as a result of an earthquake along either segment of the Hayward Fault stands above 28% in the next 30 years.

b. *Soil Conditions.* Surface soils in Fremont vary from bay mud (very expansive) to alluvial fan material (moderately to highly expansive). Expansive soils swell and shrink with variations in moisture content resulting in (1) differential "settlement" of structures, and (2) variations in surface storm water runoff. In addition, soft soil in combination with the presence of a high water table or excessively wet conditions can cause liquefaction in some sites in the event of major earthquake shaking. Structures built on soils prone to liquefaction have a greater probability severe damage in an earthquake than structures building on other soil types.

Landslides and mudslides have been experienced within the City of Fremont, along Interstate 680 south of Curtner Road, in Niles Canyon and on the westerly slopes of Mission Peak, Mt. Allison and Monument Peak. The risk of landslides and mudslides is increased when

soil moisture levels are elevated due to heavy natural precipitation or excessive application of irrigation water. When slopes fail and landslides occur in the developed areas, creeks and streams below the slide area become dammed with slide debris, which results in flooding. Additionally, landslides often block access roads in the hill area due to slope failure. This has occurred in the past on major single access roads in the City such as Morrison Canyon Road, Mill Creek Road, Interstate 680, Niles Canyon Road, and Sabercat Road which lie downhill from the area subject to landslides and slope instability.

c. *Vegetation.* Dry grass and brush are common in the hilly and open space areas during six to eight months of each year. The woodland areas along the Niles Canyon, Morrison Canyon, Mission Creek and various other canyons in the hills have stands of eucalyptus, oaks, redwoods and other broad-leaved evergreen trees. The dropped dried leaves, branches, dead trees and undergrowth of brush within these hills and canyons contribute to fuel-loading. The fire danger presented by these conditions is exacerbated by dry hot winds associated with the summer months (May through October). Many of these areas experience wild land fires that threaten nearby buildings - particularly those with wood roofs or wood siding. During the dry season, more fire department resources can be occupied with vegetation fires, which occasionally results in fewer resources are available for structure fires, than during the rest of the year.

d. *Hills, Creeks, Canals, Freeways, Railways, Housing Tracts, Large Buildings and Building Complexes.* Fremont is characterized by hills, creeks, canals, freeways, railways, housing tracts, large buildings and building complexes oriented to promote use and access by automobiles. All of these surface features, both natural and manmade, have a major adverse effect upon the road and street layout in this community, including major traffic routes. These conditions limit the number, and cause indirect routing of major arterial streets for normal traffic as well as emergency vehicle response.

e. *Terrain.* Areas with buildings include level, sloping and rolling terrain. This terrain is not dissimilar to terrain in other locations which have already experienced major conflagrations.

f. *Roads and Streets.* During the peak a.m. and p.m. traffic periods, the City experiences very heavy vehicle traffic congestion at key intersections and near freeway on-ramps and off-ramps. As noted above, the limited number and the indirect routing of some roads and streets in the community can create heavy, slow vehicle traffic conditions and excessively long travel routes from point-to-point within the community. Thus, in the event of an emergency at a key intersection, overpass, underpass, bridge, or other circulation corridor, sections of the City may become temporarily isolated and response times for emergency crews increased beyond ideal times.

Hillsides and slopes, caused by the mountains and hills surrounding the northeastern boundaries of the City of Fremont, have roadways with designated surfaces (grades) of 15% maximum; however, there are some private roadways and driveways to building sites with roadways surfaces in excess of 20%. These conditions can further slow emergency vehicle response times.

Intersections are rated based on a level of service scale. This scale is "A" for excellent operation conditions to "F" which represents a poor ratio. A printout (dated 04/27/99 @ 8:37

a.m.) of the level of service for the ninety-seven (97) studied intersections in the City of Fremont reflect ten (10) intersections received a poor rating ("E" or "F") for the a.m. peak hours and thirteen (13) intersections received a poor rating ("E" or "F") for the p.m. peak hours. These failing marks reflect "barriers" which reduce the response time of emergency fire equipment.

g. *Population.* The current and rapidly growing population in the community creates both fire and police protection problems:

(i) With more people, more emergency incidents requiring a public safety response occur. The greater the frequency of alarms, the greater the likelihood that there will be simultaneous emergency incidents requiring public safety response. This results in longer response times and fewer fire companies or police units to respond to any emergency within the community; and

(ii) With more people, there is more traffic congestion during a greater part of the day. Such traffic congestion not only slows emergency vehicle response but often restricts access to crime and fire scenes.

h. *Buildings, Landscaping and Clearances.* Many of the newer large buildings and building complexes are of designs which greatly limit visibility, approach and accessibility by public safety resources. Many houses and other buildings with wood roofs or sidings are so close together that fire will readily spread from one to another by both radiation and convection.

i. *Water Supply.* The water supply (domestic, industrial and fire-flow demands) system within the City of Fremont is directly affected by the topographical layout of the City. The water distribution system operates from eleven (11) reservoirs that are supported by twelve (12) booster pump stations strategically located throughout the City of Fremont. This water distribution system provides adequate water (fire-flow of 2,000 GPM) in most parts of the City; hydrants provide less than 500 GPM.

j. *Business & Industry Centers.* The current clusters of high-tech, bio-tech, green-tech and manufacturing businesses create additional demands on water, sewer and electrical facilities and also offers opportunities and access to innovative products and technology:

(i) The more businesses the greater the demands on water, sewer and power facilities during peak mid-day periods and could lead to shortages and service interruptions that can effect health and safety; and

(ii) The availability of high-tech, bio-tech and green-tech businesses creates unique access to innovative products and technology to reduce energy and water use and reduce waste discharge to mitigate business demands.

k. *Lack of Appropriate Waste Disposal Locations.* There are no available waste disposal locations within the City of Fremont; as a result, all waste must be exported out of the City via truck to distant locations adding numerous vehicle trips that consume nonrenewable fuel and discharge pollution into the air.

Analysis. The above local geologic and topographic conditions increase fire frequency, magnitude, exposure and accessibility problems and have a negative impact upon the response capability of public safety resources. Seismic hazards in combination within soils conditions have the potential to produce substantial structure damage or structural failure, multiple major fires and additional fire dangers, as well as place great strain on police, firefighting and rescue resources. A seismic event could also trigger widespread damage to hazardous material storage vessels and cause substantial hazardous material releases into the environment. In addition, the quantity of Police and Fire Department resources that can arrive within an effective time is limited. A major seismic event would disrupt transportation systems that already limit emergency response due to congestion, steep terrain, landslide vulnerability, firestorm vulnerability, reduced visibility and indirect routing.

3. Conclusion

Local climatic, geologic, and topographic conditions impact crime prevention efforts and the frequency, spread acceleration, intensity, and size of fires involving buildings, strength of building structural systems to resist local hazards, and ability to deliver uninterrupted water, sewer and power utility services in this community. Further, the potential for significant damage arising from these conditions is found to make it reasonably necessary that the 2010 California Building Code, 2010 California Mechanical Code, 2010 California Residential Code, 2010 California Green Building Code and 2010 California Fire Code be changed or modified to mitigate the effects of the above conditions.

PART II:

SPECIFIC MODIFICATIONS

A. Amendments to the 2010 California Fire Code

Time is the eternal enemy to the firefighter. The elapsed time from ignition to extinguishment is directly proportional to the amount of heat, smoke and toxic gases created from a fire. (See Standard Temperature-Time Curve for Control of Fire Tests, National Fire Code Standard 251, (1995 ed.) appendix B). This information demonstrates the rapid growth of heat, flame and toxic properties of fire over time. Professional sources indicate that as temperature increases over time, survivability of occupants and conservation of property decreases. (Time Available for Escape, Fire Protection Handbook 17th ed., the National Fire Protection Association, pp. 10-64).

Local environmental factors including topographical, geological and climatic conditions contribute to the likelihood of major fire, rescue and toxic containment operations as well as contribute to emergency response delays. Mitigation systems aid in the confinement, extinguishment and notification of occupants to allow for evacuation and will assist in the further reduction of injury and fatalities to life and the loss of property. The modifications proposed to the California Fire Code are designed to mitigate the response time delays, increase survivability, and mitigate the impact of hazardous materials incidents caused by the climatic, geologic and topographic conditions present in the City of Fremont. For all of the reasons listed below, these regulations are needed to reduce human and property losses due to fire or hazardous materials releases in the City of Fremont.

1. Modification to 2010 California Fire Code Sections 508 and 511

Local Conditions B.1.c, B.2.a, B.2.d, and B.2.h.

This modification to the Fire Code may require installation of air fill stations for firefighter air packs and enhanced communication systems in high-rise buildings. Air packs are the breathing devices used by firefighters. Because of the nature of high-rise buildings, more people are required to transport equipment to the upper stories of high-rise structures. It is typical for a confirmed high-rise fire to require six engines and two trucks to deal with the initial emergency and logistical needs at the scene. This code modification allows the fire department to strategically place air fill stations on specific levels of these structures.

The air fill station requirement will reduce the number of firefighting personnel required to transport air packs, freeing those individuals to perform rescue and evacuation efforts and fire extinguishment, and ultimately to be available sooner to respond to other fire, rescue or hazardous materials emergencies. The modification thus will increase firefighting efficiency. The increased efficiency will correspondingly reduce injury to persons and property in high-rise fires. The modification will help mitigate response delays caused by the nature of Fremont's transportation infrastructure and impairment of that infrastructure due to local conditions such as fog, earthquakes, firestorms, and congestion. The modification will also help mitigate fire and structural vulnerability in other structures and locations caused by Fremont's local climatic, geological and topological conditions by freeing up firefighting and rescue resources sooner. For instance, by reducing the demand on fire department resources in high-rise fires, more emergency personnel are available during dry seasons to combat wild fires in the hill areas.

The communication systems requirement will similarly increase firefighting efficiency and mitigate negative impacts of local conditions. This requirement will improve communications between firefighters and command staff. The most effective communications equipment is essential for control of teams during an emergency operation. This equipment will decrease the time needed to perform rescue operations and fire containment, and correspondingly reduce the risk to life and property.

2. Modifications to 2010 California Fire Code Sections 903, 904, and 905 (Fire Extinguishing Systems)

Local Conditions B.1.a. through B.1.e. and B.2.a. through B.2.j.

This series of modifications generally requires the installation of an automatic fire extinguishing system (AFES) in all new buildings excluding Group U, Division 1 (private garages, carports, sheds and agricultural buildings). AFES', the alternatives presented and standpipe systems are effective in confining, extinguishing, or aiding in the extinguishment of a fire, as well as reducing the amount of toxic gases and smoke generated by a fire. They also allow people to safely evacuate the building and can confine the fire until emergency resources arrive at the scene. An AFES throughout a structure serves to limit the loss of life and property.

AFES' will help mitigate dry, hot seasonal local conditions that contribute to fire ignition and fire loss. They will also help mitigate emergency response delays that impair the survival of

people and structures, whether those delays are caused by the nature of the City's transportation system, impairment of the transportation system by fog, earthquakes, firestorms, congestion and other local conditions, or deployment of firefighting resources to other emergency situations during major disasters such as firestorms or earthquakes. AFES' will also help mitigate fire and structural vulnerability in other structures and locations by helping to extinguish fires sooner, thereby freeing up firefighting and rescue resources.

3. Modifications to 2010 California Fire Code Sections 907, 914, and 4603 (Fire Alarm and Detection Systems)

Local Conditions B.1.a. through B.1.e. and B.2.a. through B.2.j.

This series of modifications requires that fire alarm and detection systems be installed to nationally recognized standards and that they "alarm" or signal with a more specific location within a building. The installation of more specific fire alarm and detection devices helps to minimize the amount of time firefighters need to determine the nature and extent of a fire and provides occupants additional time to escape.

The installation of emergency voice/alarm communication systems improves the fire department incident commander's ability to control or give instruction to the large number of people that would be expected to be present throughout a covered mall.

Hotels and motels in excess of three stories or eight sleeping units are required to install a manual fire alarm system. The installation of a manual fire alarm system can initiate an early response by firefighters and provide occupants additional time to escape.

4. Automatic Fire Extinguishing Systems Retrofit Requirements For Certain Types of Apartment Buildings (Fremont Municipal Code Title VII, Chapter 12)

Local Conditions B.1.a. through B.1.e. and B.2.a. through B.2.j.

Fremont Municipal Code Title VII, Chapter 12 requires that all existing central corridor hotel and apartment buildings (R-1 occupancies) that are two stories or more in height containing 10 or more dwellings be retrofitted with AFES. These structures are especially dangerous during a fire for the following reasons: (1) The center corridor design creates longer escape paths that the occupants must travel in the interior of building while subjected to the effects of the fire; (2) The center corridor design also creates a natural chimney effect causing an exceedingly dangerous condition known as "fire flash-over." Flash-over results from the accumulation of gases from the fire seeping through the hallway. The gases accumulate in the hallway ceiling area and ignite when the ignition temperature is reached. In the dry, hot conditions typical of Fremont summer months, this flash point is achieved sooner. Ignition of these gases can be fatal to those people in the hallway and block the escape route of occupants in their units.

The installation of AFES, smoke detectors and self-closing devices will contain the rapid spreading flame and smoke and help to prevent flash-over ignition by lowering the hallway temperature and increasing moisture. This will provide additional time for the Fire Department to respond and occupants to escape. The retrofit of AFES in center corridor residential structures

also has the same benefits as AFES installations in new structures, as discussed above regarding modifications to California Fire Code section 1003.

5. Modifications to Hazardous Materials Related Requirements – 2010 California Fire Code Sections 608, 2701-2705, 3102, 3401, 3403, 3405 and 3704.

Local Conditions B.1.c., B.1.e., B.2.a., B.2.d, and B.2.f through B.2.j.

These modifications to the California Fire Code provide extra protection systems for management and use of hazardous materials, including flammable and toxic gases, liquids and solids. These provisions require increased spill containment, improved secondary containment mechanisms for a wider range of hazardous materials, lower quantity thresholds, and construction and monitoring for hazardous materials systems.

These changes are necessitated by the likelihood of substantial earthquake events in Fremont. Intense shaking during earthquakes increases the risk of hazardous material being released, whether directly caused by the earthquake shaking, or indirectly as the result of structural failure or earthquake-caused fires. The improved management and containment measures will mitigate the possibility of containment failure during an earthquake, and correspondingly reduce the likelihood of injury to persons and loss of property caused by the release of hazardous material to the environment.

6. Modifications to 2010 California Fire Code Chapter 47

Local Conditions B.1.a. through B.1.e. and B.2.a. through B.2.j.

The Standard referenced in Chapter 37 is NFPA 13 and is being changed to align with the provisions of Chapter 903.

B. Amendments To The 2010 California Building Code

1. Automatic Fire Extinguishing Systems & Roofing Requirements

2010 CBC Sections 902 through 903

2010 CBC Sections 1507.1

2010 CBC Section 3408

Local Conditions B.1.a. through B.1.e., B.2.a, B.2.d, B.2.e., B.2.f. and B.2.h.

Earthquake hazards in the City of Fremont including the southern part of the Hayward Fault, the Calaveras Fault, the San Andreas Fault and the northern portion of the Hayward Fault could cause severe earth shaking as great as Scale X on the Modified Mercalli Intensity Scale in a large part of the City. The soft soil conditions described in Item 2b of these findings intensify this shaking.

The issue of Fire Inception and Spread is specifically discussed in detail in a study by EQE International. An analysis of Fire Ignition per Equiv. Dwelling clearly indicates that the possibility of fire ignition increases as earthquake shaking increases.⁴ This information was

developed from a large data base and should be adjusted upward when considering the extremely dry conditions existing in the City of Fremont.

One of the major established hazards associated with earthquakes is fire due to broken gas lines and short circuits of electrical systems. Most buildings in Fremont are entirely or partially combustible which increases vulnerability to fire in this City.

The Hayward Fault intersects Freeway 680 and many major thoroughfares in this City. In addition, large developments on the hillside pose additional difficulties for emergency response teams. Greatly reduced accessibility due to the obstruction of the path of travel, combined with a high demand for rescue and emergency medical treatment, will greatly limit the ability of the post-disaster fire response teams. Mutual Aid will also be rather limited, if possible at all, immediately following a major earthquake along the Hayward Fault due to the expected regional scope of such a disaster. With the inability of emergency services to guarantee rapid response to various sections of the City, it is necessary to mitigate this problem by requiring additional built-in automatic fire protection systems, which will provide for early detection and initial fire control until the arrival of the fire fighting equipment and other emergency services.

Further, Fremont has a large population of businesses handling, using and storing hazardous materials. Fire in a facility storing or using hazardous materials can spread rapidly and will be more intense and difficult to control due to the nature of the stored materials. Delay in extinguishing the fire can increase the volume and extent of the leakage or spillage of these materials, and as a result of an earthquake and an ensuing fire, can create major environmental and health crises at a local and regional level.

The proposed requirements for Roofing and Automated Fire Extinguishing Systems are reasonably necessary due to the geological, topographical and climatic conditions outlined in these findings as they would limit the spread of fires by flying ash and embers from one building to the next.

For additional findings, see Part II, Section A.2

2. Fire resistivity, Occupancy Separation, Exiting

Motor Vehicle Related Occupancies, 2010 CBC Section 406.1.4 item 1

Mixed Use And Occupancy Separation, 2010 CBC Section 508.3.3

Construction Classification, 2010 CBC Table 602, footnote c

Fire Partitions, 2010 CBC Section 709.3

Horizontal Assemblies, 2010 CBC Section 712.3

Corridors, 2010 CBC Section 1018

Minimum number of exits, 2010 CBC Section 1021

Local Condition B.2.a, B.2.h, and B.2.i.

The proposed code changes are necessary due to the proximity of most sites to the Hayward Fault and the high probability of an earthquake along the fault. The resulting intense earthquake shaking will result in a much higher demand on structures that can cause damages to

building and fire suppression system. The required fire separation between residential unit (section 420 and 709.1) and between residential occupancies and other occupancies (section 406.1.4, 508.3.2.3) provides a passive protection system and gives occupant slightly more time to exit. Disallowing elimination of rated corridor (section 1018) for group A, B, F, M, S and U provide a safe exit in the event of post-earthquake fire. Disallowing combustible decking in roof of high-rise buildings provide for safer fire suppression from roof of high-rise building in the event of post earthquake fire.

3. Wildland-Urban Interface Fire Area

Scope, Purpose and Application 2010 CBC Section 701A

Exterior Covering 2010 CBC Section 707A

Materials, Systems And Methods of Construction 2010 CBC Section 705A

Local Conditions B.1.a through B.1.e, B.2.a, B.2.c, B.2.d, B.2.e, B.2.f and B.2.h.

Remarks: Fires in Santa Barbara, the Oakland Hills and Malibu have shown that fires in hill areas spread rapidly and, in all three of these fires, burned out of control for a long time resulting in many deaths and major devastation. Post-fire analyses revealed that noncombustible buildings and those with certain fire-resistant construction had a much higher level of survivability.⁵

The Fire Hazard Zone in Fremont is highly similar to the fire zones in Oakland, Santa Barbara, and Malibu. The climate is very similar to Oakland except that Fremont is dryer and hotter during the summer. The Santa Ana winds pass through Fremont with the same speed and intensity. The potential of a major fire occurring in the Fremont Fire Hazard Zone is substantially the same as the regions named above.

The proposed construction measures are targeted to enhance the fire resistivity of structures located in the Wildland-Urban Interface Fire Area and thereby provide a reasonable level of safety for the occupants of those structures.⁶

4. Structural design and loading

Flood Load 2010 CBC Section 1612

Earthquake Loads 2010 CBC Section 1613

Local Condition B.2.a.

(a) *Flood Area 2010 CBC Section 1612 amending definition of flood hazard area to be more specific to local conditions as identified by FEMA.*

(b) *Minimum Building Separation new 2010 CBC 1613.6 amending ASCE 7, Section 12.12.3.* Section 12.12.3 of ASCE 7-05 including Supplement No. 1 does not provide requirements for separation distances between adjacent buildings. Requirements for separation distances between adjacent buildings, not structurally connected, were included in previous editions of the IBC and UBC. However, when ASCE 7-05 was adopted by reference for IBC

2006, these requirements were omitted. In addition, ASCE 7-05 defines (δx) in Section 12.8.6 to refer to the deflection of Level x at the center of mass. The actual displacement that needs to be used for building separation is the displacement at critical locations with consideration of both the translational and torsional displacements. These values can be significantly different.

This code change fills the gap of this inadvertent oversight in establishing minimum separation distance between adjoining buildings which are not structurally connected. The purpose of seismic separation is to permit adjoining buildings, or parts thereof, to respond to earthquake ground motion independently and thus preclude possible structural and non-structural damage caused by pounding between buildings or other structures.

(c) *Eccentrically braced steel frames new 2010 CBC section 1613.8 amending ASCE 7, Table 12.8-2.* The Buckling Restrained Steel Frame (BRBF) system was first approved for the 2003 NEHRP Provisions. The values for the approximate period perimeters C_r and x were also approved as part of that original BSSC Proposal 6-6R (2003). It seems to be a simple oversight that these parameters were not carried forward into the 2005 edition of ASCE 7-05. Currently, these two factors can be found in Appendix R of AISC 341-05. There, they function only as a placeholder that will be removed in the next version upon approval by ASCE 7 Task Committee on Seismic. The proposed modification is supported by the SEAOSC Steel Committee.

(d) *Vertical Irregularity new 2010 CBC section 1613.9 amending ASCE 7, 12.2.3.1, exception 3.* Observed damages to one and two family dwellings of light frame construction after the Northridge Earthquake may have been partially attributed to vertical irregularities common to this type of occupancy and construction. In an effort to improve quality of construction and incorporate lesson learned from studies after the Northridge Earthquake, the proposed modification to ASCE 7-05 Section 12.2.3.1 by limiting the number of stories and height of the structure to two stories will significantly minimize the impact of vertical irregularities and concentration of inelastic behavior from mixed structural systems.

(e) *Importance factor new 2010 CBC section 1613.10 amending ASCE 7, Section 12.8.* Importance Factor I seems to have been dropped from equation 12.8-16 by mistake while transcribing it from NEHRP Recommended Provisions (2003) equation 5.2-16. For buildings with Importance Factor I higher than 1.0, stability coefficient should include the importance factor. The proposed modification is recommended and adopted by OSPHD and DSA-SS as reflected in Section 1614A1.8 to Chapter 16 of the 2010 California Building Code. Furthermore, the proposed modification is supported by the SEAOSC Steel Committee.

(f) *Suspended Ceilings new 2010 CBC section 1613.11.* The California Building Code has no information regarding the design requirements for ceiling suspension systems for seismic loads. It is through the experience of prior earthquakes, such as the Northridge Earthquake, that this amendment is proposed so as to minimize the amount of bodily and building damage within the spaces in which this type of ceiling will be installed.

(g) *Concrete tilt-up panels, amending 2010 CBC section 1908.1.2.* This is needed to ensure that structural walls designed under ASCE 7 Table 12.2-1 using the intermediate wall panel category would conform to ductility requirements comparable to special structural wall; and conformance to the long standing practice of ACI 318 to impose special requirements for

high seismic design regions. This amendment gives explicit requirement under which design and detailing need to conform to special structural wall system provision in ACI-318 Section 21.9, which covers both cast-in-place as well as precast. This amendment further gives Building Official the tools to enforce minimum life safety building performance under earthquake forces.

(h) *Structural Steel 2010 CBC section 2205, amending AISC 341, Part I, Section 13*

Recent test results on braces used in steel concentrically braced frames (SCBF) indicate that many commonly used sections and brace configurations do not meet seismic performance expectations. Specific parameters that were shown to affect the ductility of braces included net-section, section type, width-thickness ratio of the cross section and member slenderness. Square and rectangular cross-section HSS were shown to be particularly susceptible to fracture due to local buckling behavior of the cross section and, therefore, are not recommended by SEAOSC Seismology and Steel Committee for special concentric braced frame applications. Grout-filled HSS members exhibit more favorable local buckling characteristics, significantly altering the post-yield behavior of these sections.

The proposed modification is recommended by both SEAOSC Seismology and Steel Committee. Furthermore, OSPHD has taken the same position and added Section 2205A.4.1.5.1 to Chapter 22 of the 2010 California Building Code to reflect this recommendation.

5. Inspection and Quality Control

Concrete Construction 2010 CBC Section 1704.4

Pile Foundation and Grade Beam 2010 CBC Section 1704.9

Structural Observations 2010 CBC 1710

Local Condition B.2.a.

The proposed code changes are necessary due to the proximity of most sites to the Hayward Fault and the high probability of an earthquake along the fault. The additional inspection, observation and quality control are administrative amendments necessary to obtain quality construction necessary to resist strong earthquake shaking buildings.

6. Soil Investigation and Excavation

Foundation and Soils Investigation 2010 CBC Section 1803

Excavation, Grading and Fill 2010 CBC Section 1804

Foundation Wall, Retaining Wall and Embedded Posts and Poles 2010 CBC Section 1807

Local Condition B.2.a.

The requirement for soil report and amendment to excavation and fills is due to location condition identified in Local Conditions B.2.a. and B.2.b., local soil condition and proximity to fault line.

7. Concrete Construction

Modifications to ACI 318 2010 CBC Section 1908
Structural Plain Concrete 2010 CBC Section 1909

Local Condition B.2.a

(a) *ACI 318, Section 22.10 amending 2010 CBC Section 1908.1.8.* The proposed amendment requires minimum reinforcement in continuous footings to address the problem of poor performance of plain or under-reinforced footings during a seismic event.

(b) *ACI 318, Section 21.6 amending 2010 CBC Section 1908.1.* These amendments are intended to provide increased confinement to concrete columns if certain thresholds are exceeded.

In addition, this amendment also limits the use of very highly gravity-loaded walls in being sued to resist earthquake loads.

Furthermore, this modification ensures that reinforcing bars are placed in sufficiently thick concrete to prevent buckling of such reinforcement. Rebar placed in very thin concrete topping slabs have been observed in some instances to have popped out of the slab due to insufficient concrete coverage.

8. Steel Construction

Connections 2010 CBC Section 2204

Local Condition B.2.a

A number of significant technical modifications have been made since the adoption of AISC 341-05. Once such change incorporates AWS D1.8/D1.8M by reference for welding related issues. This change will be included in AISC 341-10 that will be incorporated by reference in to the 2012 edition of International Building Code.

9. Wood Construction

General Construction Requirements 2010 CBC Section 2304
Hold down connectors 2010 CBC Section 2305.5
Quality of Nails 2010 CBC Section 2305.4
Shear Wall Construction 2010 CBC Sections 2306 and 2508
Conventional Light-Frame Construction 2010 CBC Section 2308
Gypsum Construction 2010 CBC Section 2508

Local Condition B.2.a.

The intense earthquake shaking will result in a much higher demand on structural system and hardware. Materials with low ductility will fail in the brittle mode under this high demand. Drywall and stucco shear walls have proven to be brittle in past earthquakes; therefore, modifications is required disallow these materials as shear earthquake load resisting elements. (Sections 2308.12.2.5, 2502.1, 2505.2, 2508.5). The requirement for hold down and nail quality is necessary due to proximity to fault line and importance of these material in earthquake performance of wood framed structures.

10. Existing Structures

General 2010 CBC Section 3401

Change of Occupancy 2010 CBC Section 3408

Local Conditions B.1.a through B.1.e, B.2.a, B.2.c, B.2.d, B.2.e, B.2.f and B.2.h.

The section is amended for consistency and incorporate requirements for structures located in Wildland-Urban Interface Fire Area.

C. Amendments To The 2010 California Mechanical Code

1. Commercial Hoods & Kitchen Ventilation

Commercial Hoods & Kitchen Ventilation 2010 CMC Section 507

Local Conditions B.1.a., B.1.b., B.1.d., B.1.e. and B.2.a., B.2.d., B.2.f., B.2.h, and B.2.i

There have been a number of grease duct fires in Fremont in single story buildings. These fires were contained by shafts isolating the fire to the shafts only. In cases where there was no shaft, the fire spread to the roof.

The protection of hoods and ducts in an enclosure by fire rated materials is in Code to restrict grease duct fires to the hood and duct and prevent the spread of fire from the hood or duct to the rest of the building. Portions of the hood and duct are protected so that in the case of a grease duct fire, all portions of the hood and grease duct that are in concealed spaces such as ceilings and walls, are protected in a fire rated duct enclosure.

D. Amendments To The 2010 California Residential Code

1. Fire Resistant Construction

Fire Resistant Construction 2010 CRC Section R302

Materials & Construction Methods for Exterior Wildfire Exposure 2010 CRC Section R327

Local Conditions B.1.a through B.1.e, B.2.a, B.2.c, B.2.d, B.2.e, B.2.f and B.2.h.

These modifications are consistent with modifications made to similar California Building Code sections. See Part II, B.

2. Foundations

General 2010 CRC Section R401

Foundation and Retaining Walls 2010 CRC Section 404

Local Condition B.2.a

This is consistent with modifications made to similar California Building Code sections. The requirement for soil report and amendment to excavation and fills is due to location condition identified in Local Conditions B.2.a and B.2.b, local soil condition and proximity to fault line.

3. Roof Trusses

Wood Roof Framing CRC Section R802

Local Condition B.2.a

Very frequently, wood trusses are used to transfer seismic and wind loads in structures. This amendment clarifies that roof trusses shall be designed by a registered professional to ensure that truss design incorporates all types of loads and maintain quality in design and construction.

D. Amendments To The 2010 California Green Building Code

1. Mandatory Requirements

Mandatory requirements CGBC Section A4.601.1.1

Local Conditions B.1.a., B.1.b., B.1.d., B.2.b., B.2.c., B.2.d., B.2.f., B.2.g., B.2.i. and B.2.k.

The extreme demands of the dense residential development for water, sewer and electrical utility service require active efforts to both manage demand and utilize efficient devices and systems to ensure uninterrupted availability.

The seasonally low precipitation and warm weather creates greater demands for water to meet potable and irrigation requirements and electricity for cooling requirements that have the potential to exceed supply if local measures are not implemented to manage demand through higher efficiency appliances and building and landscape design choices to reduce energy use, water use and waste water discharge below State Title 24 levels.

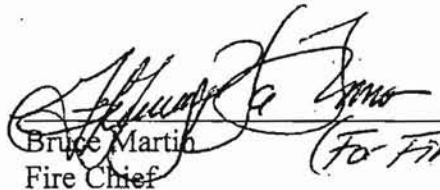
The nature and makeup of local soils that have increased risk of landslide and liquefaction when soil moisture contents are elevated requires additional measures to manage

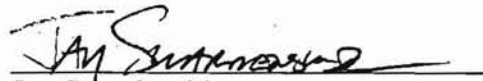
storm runoff, landscape plant selection and irrigation water application to mitigate geological risks.


The traditional dense auto-oriented development patterns create excessive traffic and congestion that impede public safety and fire response times and access if not mitigated through design means to encourage alternatives to vehicle transportation.

The lack of available waste disposal locations within a short driving distance means that the collection and disposal of solid waste creates large demands for nonrenewable energy resources, leads to roadway congestion and negative impact on public safety and fire response times and results in discharge of pollution into the air. By managing construction waste disposal by further reducing the waste stream demands on renewable energy are reduced, there is less congestion to interfere with public safety and fire response times and air quality is improved.

Prepared and Submitted by:


Bruce Martin
Fire Chief (For Fire Chief Bruce Martin)


Jay Swardenski
Fire Marshal


Steven Davis
Building Official

References:

- ¹ Jeanne Perkins, On Shaky Ground Supplement, Association of Bay Area Governments. September 1998. pg 17
- ² John Boatwright and Jeanne Perkins, On Shaky Ground. Association of Bay Area Governments, April 1995. pp. 6,7.
- ³ Wilfred D. Quan, Near Fault Seismic Issues. EERI Annual Meeting, 1997.
- ⁴ Drs. Charles Scawthorn and Mahmoud Khater, Fire Following Earthquake, Conflagration Potential in the Greater Los Angeles, San Francisco, Seattle and Memphis Areas. National Committee on Property Insurance. 1992. Figure 3-7, Section 3-23.
- ⁵ Scawthorn and Khater, Fire Following Earthquake.
- ⁶ Scawthorn and Khater, Fire Following Earthquake. Section 3-15.

Other Supporting Documents:

1994 Northridge Earthquake. Seismic Safety Commission, 1994

Earthquake Planning Scenario for a Magnitude 7.5 Earthquake on the Hayward Fault in the San Francisco Bay Area. California Department of Conservation, Division of Mines and Geology 1987

Proceedings, Conference on Earthquake Hazards in the Eastern San Francisco Bay Area. California Department of Conservation, Division of Mines and Geology 1982.

Fremont Meadows Active Fault Investigation and Evaluation. Woodward-Clyde & Associates. 1970

RESOLUTION NO. 2010-67

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF FREMONT REGARDING COST EFFECTIVENESS OF LOCAL AMENDMENTS TO ENERGY REGULATIONS IN THE 2010 CALIFORNIA GREEN BUILDING CODE

WHEREAS, on October 26, 2010, the City Council introduced Ordinance 23-2010 adopting the 2010 California Green Building Code and amending that code by modifying the Residential Voluntary Measures in Appendix 4A to make Tier I compliance mandatory for low-rise residential buildings and modifying the definition of low-rise residential building to include buildings having six or fewer stories; and

WHEREAS, Public Resources Code Section 25402.1 and California Buildings Standards Administrative Code Section 10-106 allow a city to adopt and enforce energy standards if the city determines at a public meeting that the standards are cost effective, and the California Energy Commission finds that the standards will require buildings to consume no more energy than permitted by the California Energy Code; and

WHEREAS, the City Council has considered the October 26, 2010 staff report discussing the proposed amendments to the 2010 California Green Building Code and the presentations by staff, has considered the proposed ordinance containing the amendments attached to the report, has considered the November 23, 2010 staff report discussing the proposed determination of cost effectiveness and has reviewed the proposed findings attached to the report, and has held public hearings to receive input from the community on October 26, 2010 and November 23, 2010;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF FREMONT HEREBY RESOLVES AS FOLLOWS:

SECTION 1. Determination of Cost Effectiveness.

- (a) The City Council finds, as discussed in Attachment 1 hereto, that the proposed energy standards are cost-effective.
- (b) The City Council finds the proposed standards will require buildings to be designed to consume no more energy than permitted by the 2010 California Energy Code.

* * *

ADOPTED November 23rd, 2010, by the City Council of the City of Fremont by the following vote, to wit:

AYES:	Mayor Wasserman, Vice Mayor Chan, Councilmembers Wieckowski, Natarajan and Harrison
NOES:	None
ABSENT:	None
ABSTAIN:	None

Bob Wasserman
Mayor

ATTEST:

Dawn C. Abrahamson
City Clerk

APPROVED AS TO FORM:

Att. Kern
Senior Deputy City Attorney

I HEREBY CERTIFY THAT THE ABOVE
IS A TRUE AND CORRECT COPY OF
A DOCUMENT IN THE FILES OF THE
CITY OF FREMONT

Dawn C. Abrahamson
DAWN C. ABRAHAMSON
CITY CLERK

DATE: 12/1/10

ATTACHMENT 1
to
City of Fremont City Council Resolution 2010-67

INTRODUCTION

The City of Fremont intends to adopt local energy standards that require new residential buildings six stories or less in height to be designed and constructed so that they consume 15% less energy than would otherwise be permitted by the State of California Energy Code.

PART I:
STATEMENT OF FACTS

The City of Fremont will at a minimum enforce the State of California Energy Code, California Code of Regulations, Title 24, Part 6 and will require all new buildings and all additions, alterations and repairs to existing buildings to be designed and constructed to consume no more energy than permitted by Title 24, Part 6.

The specific local regulations are articulated in City of Fremont Ordinance 23-2010 which was introduced on October 26, 2010 and adopted on November 23, 2010 and will become effective on January 1, 2011.

The City of Fremont has determined that if the incremental additional construction costs to achieve the proposed 15% reduction in energy consumption can be paid back through energy savings in less time than the useful life of a new building, than the investment in future energy savings is cost effective.

The typical useful life for new residential buildings in the City of Fremont is between 50-years and 80-years; therefore, the average useful life for residential buildings is 65-years.

In considering the need for local energy standards, the City of Fremont utilized "Mocropas 8" the State of California approved energy compliance software and the 2008 Building Energy Efficiency Standards to calculate energy use and energy savings.

The City of Fremont also relied on the "Climate Zone 3 Cost-Effectiveness Study" prepared by Gabel Associates, LLC, dated July 19, 2010. This study evaluated the incremental construction costs necessary to achieve a 15% reduction in energy use. This study concludes that the simple payback period to recover the incremental additional construction costs ranges from 14.7-years to 35.6-years. This range of payback period considers a number of different building sizes and heights as well as a range of possible features that are more or less effective at reducing overall energy consumption. A copy of this Cost-Effectiveness Study is available in the Office of the City Clerk.

PART II: CONCLUSION

Based on the Gabel Associates Cost-Effectiveness Study, the average payback period to recover the original construction costs to achieve a 15% reduction in energy use is 25.2-years. In the City of Fremont the average useful life for residential buildings is 65-years. This average payback period is less than the average useful life for new residential buildings.

Therefore, the City of Fremont finds that the proposed local energy standards that require new residential buildings six-stories or less in height to be designed and constructed to consume 15% less energy than would otherwise be permitted by the State of California Energy Code are cost effective.

Prepared and Submitted by:


Steven Davis
Building Official

Codes and Standards Title 24 Energy-Efficient Local Ordinances

Title: Climate Zone 3 Energy Cost-Effectiveness Study

Prepared for:

Pat Eilert
Codes and Standards Program
Pacific Gas and Electric Company

Maril Pitcock
Government Partnership Program
Pacific Gas and Electric Company

Prepared by:
Gabel Associates, LLC

Last Modified: July 19, 2010



Climate Zone 3 Energy Cost-Effectiveness Study

July 19, 2010

Report prepared by:

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Report on behalf of:

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LEGAL NOTICE

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1.0 Executive Summary

This report presents the results of Gabel Associates' research and review of the feasibility and energy cost-effectiveness of building permit applicants exceeding the 2008 Building Energy Efficiency Standards to meet the minimum energy-efficiency requirements of local energy efficiency standards covering Climate Zone 3. A local government may use this report as a basis for demonstrating energy cost-effectiveness of a proposed green building or energy ordinance. The study assumes that such an ordinance requires, for the building categories covered, that building energy performance exceeds the 2008 TDV energy standard budget by at least 15%.

The study is also contained in the local government's application to the California Energy Commission (CEC) which must meet all requirements specified in Section 10-106 of the California Code of Regulations, Title 24, Part 1, Article 1: Locally Adopted Energy Standards. An ordinance shall be legally enforceable (a) after the CEC has reviewed and approved the local energy standards as meeting all requirements of Section 10-106; and (b) the ordinance has been adopted by the local government and filed with the Building Standards Commission.

The 2008 Building Energy Efficiency Standards, which took effect on January 1, 2010, are the baseline used to calculate the cost-effectiveness data.

2.0 Methodology and Assumptions

The energy performance impacts of exceeding the performance requirements of the 2008 Title 24 Building Energy Efficiency Standards (2008 Standards) have been evaluated in Climate Zone 3 using the following residential and nonresidential prototypical building types:

Small Single Family House 2-story 2,025 sf	Large Single Family House 2-story 4,500 sf
Low-rise Multi-family Apartments 8 dwelling units/2-story 8,442 sf	High-rise Multi-family Apartments 40 dwelling units/4-story 36,800 sf
Low-rise Office Building 1-story 10,580 sf	High-rise Office Building 5-story 52,900 sf

Methodology

The methodology used in the case studies is based on a design process for each of the proposed prototypical building types that first meets the minimum requirements and then exceeds the 2008 Standards by 15%. The process includes the following major stages:

Stage 1: Minimum Compliance with 2008 Standards:

Each prototype building design is tested for minimum compliance with the 2008 Standards, and the mix of energy measures are adjusted using common construction options so the building first just meets the Standards. The set of energy measures chosen represent a reasonable combination which reflects how designers, builders and developers are likely to achieve a specified level of performance using a relatively low first incremental (additional) cost.

Stage 2: Incremental Cost for Exceeding 2008 Standards by 15%:

Starting with that set of measures which is minimally compliant with the 2008 Standards, various energy measures are upgraded so that the building just exceeds the 2008 Standards by 15%. The design choices by the consultant authoring this study are based on many years of experience with architects, builders, mechanical engineers; and general knowledge of the relative acceptance and preferences of many measures, as well as their incremental costs. This approach tends to reflect how building energy performance is typically evaluated for code compliance and how it's used to select design energy efficiency measures. Note that lowest simple payback with respect to building site energy is not the primary focus of selecting measures; but rather the requisite reduction of Title 24 Time Dependent Valuation(TDV) energy at a reasonable incremental cost consistent with other non-monetary but important design considerations. A minimum and

maximum range of incremental costs of added energy efficiency measures is established by a variety of research means. A construction cost estimator, Building Advisory LLC, was contracted to conduct research to obtain current measure cost information for many energy measures; and Gabel Associates performed its own additional research to establish first cost data.

Stage 3: Cost Effectiveness Determination:

Energy savings in kWh and therms is calculated from the Title 24 simulation results to establish the annual energy cost savings and CO₂-equivalent reductions in greenhouse gases. A simple payback analysis in years is calculated by dividing the incremental cost for exceeding the 2008 Standards by the estimated annual energy cost savings.

Assumptions

Annual Energy Cost Savings

1. Annual site electricity (kWh) and natural gas (therms) saved are calculated using Micropas 8, state-approved energy compliance software for the 2008 Building Energy Efficiency Standards.
2. Average residential utility rates of \$0.18/kWh for electricity and \$1.15/therm for natural gas in current constant dollars; nonresidential rates are time-of-use rate schedules modeled explicitly in the DOE-2.1E computer simulation: PG&E A-6 schedule for electricity and PG&E G-NR1 schedule for natural gas.
3. No change (i.e., no inflation or deflation) of utility rates in constant dollars
4. No increase in summer temperatures from global climate change

Simple Payback Analysis

1. No external cost of global climate change -- and corresponding value of additional investment in energy efficiency and CO₂ reduction -- is included
2. The cost of money (e.g., opportunity cost) invested in the incremental cost of energy efficiency measures is not included.

3.0 Minimum Compliance with 2008 Standards

The following energy design descriptions of the following building prototypes just meet the 2008 Standards in Climate Zone 3.

Small Single Family House

- ☐ 2,025 square feet
- ☐ 2-story
- ☐ 20.2% glazing/floor area ratio

Energy Efficiency Measures

R-38 Roof w/ Radiant Barrier
R-13 Walls
R-30 Raised Floor over Garage/Open at 2nd Floor
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: None
R-8 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
50 Gallon Gas Water Heater: EF=0.62

Large Single Family House

- ☐ 4,500 square feet
- ☐ 2-story
- ☐ 22.0% glazing/floor area ratio

Energy Efficiency Measures

R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(2) Furnaces: 80% AFUE
Air Conditioner: None
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(2) 50 Gallon Gas Water Heaters: EF=0.61

Low-rise Multi-family Apartments

- ☐ 8,442 square feet
- ☐ 8 units/2-story
- ☐ 12.5% glazing/floor area ratio

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(8) Furnaces: 80% AFUE
Air Conditioner: None
R-6 Attic Ducts
(8) 40 Gallon Gas Water Heaters: EF=0.63
Pipe Insulation

High-rise Multifamily Apartments

- ☐ 36,800 sf,
- ☐ 40 units
- ☐ 4-story
- ☐ Window to Wall Ratio = 35.2%

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck and additional R-11 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75
R-19 in Metal Frame Walls
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage
Dual Metal Windows: default U-factor=0.79, SHGC COG = 0.38
1.5 ton 4-pipe fan coils, 80% AFUE boiler, 70-ton scroll air cooled chiller @ 0.72 KW/ton
Central DHW boiler: 80% AFUE and recirculating system w/ timer-temperature controls

Low-rise Office Building

- ☐ Single Story
- ☐ 10,580 sf,
- ☐ Window to Wall Ratio = 37.1%

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck, no cool roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Metal windows: Default glazing U=0.71, COG SHGC=0.54
Lighting = 0.858 w/sf: Open Office Areas: (60) 2-lamp T8 fixtures @58w each; (24) 18w recessed CFLs no lighting controls. Small Offices: (56) 2-lamp T8 fixtures; (40) 18w recessed CFLs, on/off lighting controls. Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.
(3) 10-ton DX units EER=11.0; 80% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers
R-6 duct insulation w/ ducts on roof
(1) Tank Gas Water Heaters EF=0.58

High-rise Office Building

- ☐ 5-story
- ☐ 52,900 sf,
- ☐ Window to Wall Ratio = 34.5%

Design "A" for Options 1 and 2

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck, no cool roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Metal windows: Default glazing U=0.71, SHGC = 0.73
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 20% VAV boxes, electric water reheat on perimeter zones
R-6 duct insulation w/ ducts in conditioned
(1) Tank Gas Water Heaters EF=0.58

Design "B" for Options 3, 4 and 5

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck, no cool roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Metal windows: Default glazing $U=0.71$, $SHGC = .73$
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 25% VAV boxes, hot water reheat on perimeter zones with 80% AFUE boiler.
R-6 duct insulation w/ ducts in conditioned
DHW 80% AFUE boiler

4.0 Incremental Cost to Exceed 2008 Standards by 15%

The following tables list the energy features and/or equipment included in the 2008 Standards base design, the efficient measure options, and an estimate of the incremental cost for each measure included to improve the building performance to use 15% less TDV energy than the corresponding Title 24 base case design.

Small Single Family House

- ☐ 2,025 square feet
- ☐ 2-story
- ☐ 20.2% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15%

Single Family Prototype: 2,025 SF, Option 1

2025 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-19 Walls (from R-13): 2,550 sf @\$0.31 to \$0.54/sf	Upgrade	\$ 791	\$ 1,377	\$ 1,084
R-30 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 92% AFUE (from 80% AFUE)	Upgrade	\$ 500	\$ 1,200	\$ 850
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-6 Attic Ducts (from R-8)	Downgrade	\$ (325)	\$ (225)	\$ (275)
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
50 Gallon Gas Water Heater: EF=0.62	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 966	\$ 2,352	\$ 1,659
Total Incremental Cost per Square Foot:		\$ 0.48	\$ 1.16	\$ 0.82

Incremental Cost Estimate to Exceed Title 24 by 15%

Single Family Prototype: 2,025 SF, Option 2

2025 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-19 Walls (from R-13): 2,550 sf @\$0.31 to \$0.54/sf	Upgrade	\$ 791	\$ 1,377	\$ 1,084
R-30 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-8)	Downgrade	\$ (650)	\$ (450)	\$ (550)
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
Instantaneous Gas Water Heater: RE=0.80 (from 50 Gal Gas: EF=0.62)	Upgrade	\$ 900	\$ 1,500	\$ 1,200
Total Incremental Cost of Energy Efficiency Measures:		\$ 1,041	\$ 2,427	\$ 1,734
Total Incremental Cost per Square Foot:		\$ 0.51	\$ 1.20	\$ 0.86

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 2,025 SF, Option 3

2025 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-21 Walls (from R-13): 2,550 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 1,148	\$ 1,785	\$ 1,466
R-30 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 90% AFUE (from 80% AFUE)	Upgrade	\$ 500	\$ 1,000	\$ 750
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-8)	Downgrade	\$ (650)	\$ (450)	\$ (550)
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
50 Gallon Gas Water Heater: EF=0.61 (from EF=0.62)	Downgrade	\$ (100)	\$ (50)	\$ (75)
Total Incremental Cost of Energy Efficiency Measures:		\$ 898	\$ 2,285	\$ 1,591
Total Incremental Cost per Square Foot:		\$ 0.44	\$ 1.13	\$ 0.79

Large Single Family House

- ☐ 4,500 square feet
- ☐ 2-story
- ☐ 22.0% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 4,500 SF, Option 1

4500 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/ Radiant Barrier): 2,700 sf @ 0.15 to 0.20/sf	Upgrade	\$ 405	\$ 540	\$ 473
R-21 Walls (from R-13): 2,518 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 1,133	\$ 1,763	\$ 1,448
R-30 Raised Floor (from R-19): 2,700 sf @ \$0.25 to \$0.35	Upgrade	\$ 675	\$ 945	\$ 810
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-8 Attic Ducts (from R-6)	Upgrade	\$ 450	\$ 650	\$ 550
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.62 (from EF=0.61)	Upgrade	\$ 100	\$ 200	\$ 150
Total Incremental Cost of Energy Efficiency Measures:		\$ 2,763	\$ 4,098	\$ 3,430
Total Incremental Cost per Square Foot:		\$ 0.61	\$ 0.91	\$ 0.76

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 4,500 SF, Option 2

4500 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/ Radiant Barrier): 2,700 sf @ 0.15 to 0.20/sf	Upgrade	\$ 405	\$ 540	\$ 473
R-15 Walls (from R-13): 2,518 sf @ \$0.14 to \$0.18/sf	Upgrade	\$ 353	\$ 453	\$ 403
R-30 Raised Floor (from R-19): 2,700 sf @ \$0.25 to \$0.35	Upgrade	\$ 675	\$ 945	\$ 810
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	\$ 1,000	\$ 2,400	\$ 1,700
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-8 Attic Ducts (from R-6)	Upgrade	\$ 450	\$ 650	\$ 550
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.63 (from EF=0.61)	Upgrade	\$ 100	\$ 300	\$ 200
Total Incremental Cost of Energy Efficiency Measures:		\$ 2,983	\$ 5,288	\$ 4,135
Total Incremental Cost per Square Foot:		\$ 0.66	\$ 1.18	\$ 0.92

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 4,500 SF, Option 3

4500 sf

Climate Zone 3

Energy Efficiency Measures	Change	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/ Radiant Barrier): 2,700 sf @ 0.15 to 0.20/sf	Upgrade	\$ 405	\$ 540	\$ 473
R-19 Walls (from R-13): 2,518 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 781	\$ 1,360	\$ 1,070
R-19 Raised Floor	-	\$ -	\$ -	\$ -
Quality Insulation Installation (HERS)	Upgrade	\$ 900	\$ 1,200	\$ 1,050
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-6 Attic Ducts	-	\$ -	\$ -	\$ -
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.63 (from EF=0.61)	Upgrade	\$ 100	\$ 300	\$ 200
Total Incremental Cost of Energy Efficiency Measures:		\$ 2,186	\$ 3,400	\$ 2,793
Total Incremental Cost per Square Foot:		\$ 0.49	\$ 0.76	\$ 0.62

Low-rise Multi-family Apartments

- ☐ 8,442 square feet
- ☐ 8 units/2-story
- ☐ 12.5% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15%

Multi-Family Prototype: 8,442 SF, Option 1

8442 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-21 Walls (from R-13): 10,146 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 4,566	\$ 7,102	\$ 5,834
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (1,600)	\$ (1,000)	\$ (1,300)
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,400	\$ 4,800	\$ 3,600
(8) 40 Gallon Gas Water Heaters: EF=0.63	-	\$ -	\$ -	\$ -
Remove Pipe Insulation	Downgrade	\$ (1,600)	\$ (1,200)	\$ (1,400)
Total Incremental Cost of Energy Efficiency Measures:		\$ 3,766	\$ 9,702	\$ 6,734
Total Incremental Cost per Square Foot:		\$ 0.45	\$ 1.15	\$ 0.80

Incremental Cost Estimate to Exceed Title 24 by 15%

Multi-Family Prototype: 8,442 SF, Option 2

8442 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,221 sf @ 0.15 to 0.20/sf	Upgrade	\$ 633	\$ 844	\$ 739
R-19 Walls (from R-13): 10,146 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 3,145	\$ 5,479	\$ 4,312
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-6 Attic Ducts	-	\$ -	\$ -	\$ -
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,400	\$ 4,800	\$ 3,600
(8) 40 Gallon Gas Water Heaters: EF=0.63	-	\$ -	\$ -	\$ -
Remove Pipe Insulation	Downgrade	\$ (1,600)	\$ (1,200)	\$ (1,400)
Total Incremental Cost of Energy Efficiency Measures:		\$ 4,578	\$ 9,923	\$ 7,251
Total Incremental Cost per Square Foot:		\$ 0.54	\$ 1.18	\$ 0.86

Incremental Cost Estimate to Exceed Title 24 by 15%
Multi-Family Prototype: 8,442 SF, Option 3

8442 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,221 sf @ 0.25 to 0.35/sf	Downgrade	\$ (1,477)	\$ (1,055)	\$ (1,266)
R-19 Walls (from R-13): 10,146 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 3,145	\$ 5,479	\$ 4,312
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 90% AFUE (from 80% AFUE)	Upgrade	\$ 4,000	\$ 8,000	\$ 6,000
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (1,600)	\$ (1,000)	\$ (1,300)
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,400	\$ 4,800	\$ 3,600
(8) 40 Gallon Gas Water Heaters: EF=0.62 (from EF=0.63)	Downgrade	\$ (400)	\$ -	\$ (200)
Remove Pipe Insulation	Downgrade	\$ (1,600)	\$ (1,200)	\$ (1,400)
Total Incremental Cost of Energy Efficiency Measures:		\$ 4,468	\$ 15,024	\$ 9,746
Total Incremental Cost per Square Foot:		\$ 0.53	\$ 1.78	\$ 1.15

High-rise Multifamily Apartments

- ☐ 36,800 sf,
- ☐ 40 units/4-story
- ☐ Window to Wall Ratio = 31.6%

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 1

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-30 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 9,200 sf @ \$0.30 to \$0.40/sf	Upgrade	\$ 2,760	\$ 3,680	\$ 3,220
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage	-	\$ -	\$ -	\$ -
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.27 6,240 sf @ \$2.00 to \$3.00/sf	Upgrade	\$ 12,480	\$ 18,720	\$ 15,600
1.5 ton 4-pipe fan coil, 98% AFUE boiler, 60-ton scroll air cooled chiller 0.72 KW/ton (cost of boiler below under DHW)	Upgrade	\$ -	\$ -	\$ -
Central DHW boiler: 98% AFUE and recirculating system w/ timer- temperature controls	Upgrade	\$ 4,000	\$ 8,000	\$ 6,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 19,240	\$ 30,400	\$ 24,820
Total Incremental Cost per Square Foot:		\$ 0.52	\$ 0.83	\$ 0.67

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 2

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-11 batt below (no framing); with no cool roof; 9,200 sf @ \$0.35 to \$0.50/sf	Downgrade	\$ (3,220)	\$ (4,600)	\$ (3,910)
R-19 in Metal Frame Walls w/ 1" continuous outside (R-5); 12,112 sf @ \$4.00/sf to \$7.00/sf	Upgrade	\$ 48,448	\$ 84,784	\$ 66,616
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage	-	\$ -	\$ -	\$ -
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.31 6,240 sf @ \$1.00 to \$2.00/sf	Upgrade	\$ 6,240	\$ 12,480	\$ 9,360
1.5 ton 4-pipe fan coil, 98% AFUE boiler, 60-ton scroll air cooled chiller 0.72 KW/ton (cost of boiler below under DHW)	Upgrade	\$ -	\$ -	\$ -
Central DHW boiler: 98% AFUE and recirculating system w/ timer-temperature controls	Upgrade	\$ 4,000	\$ 8,000	\$ 6,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 55,468	\$100,664	\$ 78,066
Total Incremental Cost per Square Foot:		\$ 1.51	\$ 2.74	\$ 2.12

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 3

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-30 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 9,200 sf @ \$0.30 to \$0.40/sf	Upgrade	\$ 2,760	\$ 3,680	\$ 3,220
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage	-	\$ -	\$ -	\$ -
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.38 6,240 sf @ \$0.50 to \$1.00/sf	Upgrade	\$ 3,120	\$ 6,240	\$ 4,680
1.5 ton 4-pipe fan coil, 94% AFUE boiler, 70-ton scroll air cooled chiller 0.72 KW/ton	Upgrade	\$ 3,000	\$ 6,000	\$ 4,500
Central DHW boiler: 94% AFUE and recirculating system w/ timer-temperature controls and solar water heating, 25% Net Solar Fraction (cost of boiler above under space heating boiler)	Upgrade	\$ 40,000	\$ 55,000	\$ 47,500
Total Incremental Cost of Energy Efficiency Measures:		\$ 48,880	\$ 70,920	\$ 59,900
Total Incremental Cost per Square Foot:		\$ 1.33	\$ 1.93	\$ 1.63

Low-rise Office Building

- ☐ Single Story
- ☐ 10,580 sf,
- ☐ Window to Wall Ratio = 37.1%

Incremental Cost Estimate to Exceed Title 24 by 15%**Nonresidential Prototype: 10,580 SF, Option 1****Climate Zone 3**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.60 to \$0.85/sf	Upgrade	\$ 6,348	\$ 8,993	\$ 7,671
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.38; 3,200 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 4,800	\$ 6,400	\$ 5,600
Lighting = 0.783 w/sf: Open Office Areas: (60) 2-lamp T8 fixtures @58w each; (24) 18w recessed CFLs no lighting controls. Small Offices: (56) 2-lamp T8 fixtures, (40) 18w recessed CFLs; (28) multi-level occupancy sensors on T8s and recessed CFLa @ \$75 to \$100 each. Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.	Upgrade	\$ 2,100	\$ 2,800	\$ 2,450
(3) 10-ton DX units EER=11.0; 80% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers	-	\$ -	\$ -	\$ -
R-6 duct insulation w/ducts on roof, HERS verified duct leakage	Upgrade	\$ 1,000	\$ 1,800	\$ 1,400
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 14,248	\$ 19,993	\$ 17,121
Total Incremental Cost per Square Foot:		\$ 1.35	\$ 1.89	\$ 1.62

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 10,580 SF, Option 2

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-25 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.75 to \$1.10/sf	Upgrade	\$ 7,935	\$ 11,638	\$ 9,787
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.27 ; 3,200 sf @ \$2.00 to \$3.00/sf	Upgrade	\$ 6,400	\$ 9,600	\$ 8,000
Lighting = 0.858 w/sf: Open Office Areas: (60) 2-lamp T8 fixtures @58w each; (24) 18w recessed CFLs no lighting controls. Small Offices: (56) 2-lamp T8 fixtures; (40) 18w recessed CFLs, on/off lighting controls. Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.	-	\$ -	\$ -	\$ -
(3) 10-ton DX units EER=11.0; 80% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers, Controls to include "Cycle on at night"	Upgrade	\$ 300	\$ 600	\$ 450
R-6 duct insulation w/ducts on roof, HERS verified duct leakage	Upgrade	\$ 1,000	\$ 1,800	\$ 1,400
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 15,635	\$ 23,638	\$ 19,637
Total Incremental Cost per Square Foot:		\$ 1.48	\$ 2.23	\$ 1.86

Incremental Cost Estimate to Exceed Title 24 by 15%

Nonresidential Prototype: 10,580 SF, Option 3

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); no cool roof; 10,580 sf @ \$0.25 to \$0.35/sf	Upgrade	\$ 2,645	\$ 3,703	\$ 3,174
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.38 ; 3,200 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 4,800	\$ 6,400	\$ 5,600
Lighting = 0.746 w/sf. Open Office Areas: (32) HO 2-lamp T8 fixtures @74w each ; (24) 18w recessed CFLs no lighting controls. Small Offices: (56) 2-lamp T8 fixtures, (40) 18w recessed CFLs: (28) multi-level occupancy sensors on T8s and recessed CFLa @ \$75 to \$100 each . Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces: no controls.	Upgrade	\$ 820	\$ 1,648	\$ 1,234
(3) 10-ton DX units EER=11.0; 80% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers, Controls to include "Cycle on at night"	Upgrade	\$ 300	\$ 600	\$ 450
R-6 duct insulation w/ ducts on roof	-			
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 8,565	\$ 12,351	\$ 10,458
Total Incremental Cost per Square Foot:		\$ 0.81	\$ 1.17	\$ 0.99

High-rise Office Building

- ☐ 5-story
- ☐ 52,900 sf,
- ☐ Window to Wall Ratio = 34.5%

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 1

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck with Cool Roof Reflectance = 0.55, Emittance = 0.75 ; 10,580 sf @ \$0.35 to \$0.50/sf	Upgrade	\$ 3,703	\$ 5,290	\$ 4,497
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.38 ; 16,000 sf @ \$2.00 to \$2.50/sf	Upgrade	\$ 32,000	\$ 40,000	\$ 36,000
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	-	\$ -	\$ -	\$ -
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 15% VAV boxes , electric water reheat on perimeter zones	Upgrade	\$ 26,450	\$ 39,675	\$ 33,063
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 62,153	\$ 84,965	\$ 73,559
Total Incremental Cost per Square Foot:		\$ 1.17	\$ 1.61	\$ 1.39

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 2

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); no cool roof; 10,580 sf @ \$0.25 to \$0.35/sf	Upgrade	\$ 2,645	\$ 3,703	\$ 3,174
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.54 ; 16,000 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 24,000	\$ 32,000	\$ 28,000
Lighting = 0.783 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs multi-level occupancy sensors on T8s and recessed CFLs @ \$75 to \$100 each . Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	Upgrade	\$ 10,500	\$ 14,000	\$ 12,250
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 15% VAV boxes , electric water reheat on perimeter zones	Upgrade	\$ 26,450	\$ 52,900	\$ 39,675
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 63,595	\$102,603	\$ 83,099
Total Incremental Cost per Square Foot:		\$ 1.20	\$ 1.94	\$ 1.57

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 3

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); no cool roof; 10,580 sf @ \$0.25 to \$0.35/sf	Upgrade	\$ 2,645	\$ 3,703	\$ 3,174
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.54 ; 16,000 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 24,000	\$ 32,000	\$ 28,000
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	-	\$ -	\$ -	\$ -
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 20% VAV boxes , hot water reheat on perimeter zones with 92% AFUE boiler (cost of boiler included below for DHW)	Upgrade	\$ 26,450	\$ 52,900	\$ 39,675
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
DHW 92% AFUE boiler	Upgrade	\$ 2,000	\$ 4,000	\$ 3,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 55,095	\$ 92,603	\$ 73,849
Total Incremental Cost per Square Foot:		\$ 1.04	\$ 1.75	\$ 1.40

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 4

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.60 to \$0.85/sf	Upgrade	\$ 6,348	\$ 8,993	\$ 7,671
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.54; 16,000 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 24,000	\$ 32,000	\$ 28,000
Lighting = 0.783 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs multi-level occupancy sensors on T8s and recessed CFLs @ \$75 to \$100 each. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	Upgrade	\$ 10,500	\$ 14,000	\$ 12,250
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 25% VAV boxes, hot water reheat on perimeter zones with 92% AFUE boiler (cost of boiler included below for DHW)	Upgrade	\$ -	\$ -	\$ -
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
DHW 92% AFUE boiler	Upgrade	\$ 2,000	\$ 4,000	\$ 3,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 42,848	\$ 58,993	\$ 50,921
Total Incremental Cost per Square Foot:		\$ 0.81	\$ 1.12	\$ 0.96

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 5

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.60 to \$0.85/sf	Upgrade	\$ 6,348	\$ 8,993	\$ 7,671
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.54; 16,000 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 24,000	\$ 32,000	\$ 28,000
Lighting = 0.678 w/sf: Open Office Areas: (160) 2-lamp T8 fixtures @74w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs multi-level occupancy sensors on T8s and recessed CFLs @ \$75 to \$100 each. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	Upgrade	\$ 10,500	\$ 14,000	\$ 12,250
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 25% VAV boxes, hot water reheat on perimeter zones with 94% AFUE boiler (cost of boiler included below for DHW).	Upgrade	\$ -	\$ -	\$ -
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
DHW 94% AFUE boiler	Upgrade	\$ 4,000	\$ 8,000	\$ 6,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 44,848	\$ 62,993	\$ 53,921
Total Incremental Cost per Square Foot:		\$ 0.85	\$ 1.19	\$ 1.02

5.0 Cost -Effectiveness Determination

Regardless of the building design, occupancy profile and number of stories, the incremental improvement in overall annual energy performance of buildings in exceeding the 2008 Standards is determined to be cost-effective. However, each building's overall design, occupancy type and specific design choices may allow for a large range of incremental costs for exceeding 2008 Standards, estimated annual energy cost savings, and subsequent payback period.

Small Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
2,025 sf (Option 1)	78	85	\$1,659	\$112	14.8
2,025 sf (Option 2)	72	87	\$1,734	\$113	15.3
2,025 sf (Option 3)	85	81	\$1,592	\$108	14.7
Averages:	78	84	\$1,662	\$111	15.0

Annual Reduction in CO2-equivalent: 0.50 lb./sq.ft.-year, 1,017 lb./building-year
Increased Cost / lb. CO2-e reduction: \$1.63

Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
4,500 sf (Option 1)	181	105	\$3,431	\$153	22.4
4,500 sf (Option 2)	88	117	\$4,136	\$150	27.5
4,500 sf (Option 3)	172	106	\$2,793	\$153	18.3
Averages:	147	109	\$3,453	\$152	22.7

Annual Reduction in CO2-equivalent: 0.30 lb./sq.ft.-year, 1,339 lb./building-year
Increased Cost / lb. CO2-e reduction: \$2.58

Low-rise Multi-family Apartments

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
8-Unit, 8,442 sf (Option 1)	569	345	\$6,734	\$499	13.5
8-Unit, 8,442 sf (Option 2)	552	342	\$7,251	\$493	14.7
8-Unit, 8,442 sf (Option 3)	453	337	\$9,746	\$469	20.8
8-Unit, 8,442 sf (Option 4)	57	396	\$8,323	\$466	17.9
Averages:	354	358	\$8,440	\$476	17.8

Annual Reduction in CO2-equivalent: 0.51 lb./sq.ft.-year, 4,316 lb./building-year
Increased Cost / lb. CO2-e reduction: \$1.86

High-rise Multi-family Apartments

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
36,800 sf (Option 1)	668	1766	\$24,820	\$2,151	11.5
36,800 sf (Option 2)	-2616	2314	\$78,066	\$2,190	35.6
36,800 sf (Option 3)	-2519	2811	\$51,940	\$2,779	18.7
Averages:	-1489	2297	\$51,609	\$2,374	22.0

Annual Reduction in CO2-equivalent: 0.71 lb./sq.ft.-year, 26,067 lb./building-year
Increased Cost / lb. CO2-e reduction: \$1.97

Low-rise Office Building

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
10,580 sf (Option 1)	10410	-79	\$17,121	\$2,765	6.2
10,580 sf (Option 2)	8612	-182	\$19,637	\$2,247	8.7
10,580 sf (Option 3)	10594	-223	\$10,458	\$2,475	4.2
Averages:	9872	-161	\$15,738	\$2,496	6.4

Annual Reduction in CO2-equivalent: 0.24 lb./sq.ft.-year, 2,564 lb./building-year
Increased Cost / lb. CO2-e reduction: \$7.17

High-rise Office Building

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
52,900 sf (Option 1)	76452	-16	\$73,559	\$17,629	4.2
52,900 sf (Option 2)	74762	-3	\$83,099	\$16,457	5.0
52,900 sf (Option 3)	40583	4523	\$73,849	\$16,248	4.5
52,900 sf (Option 4)	55173	2217	\$50,921	\$34,725	1.5
52,900 sf (Option 5)	40996	4871	\$53,921	\$31,964	1.7
Averages:	57593	2318	\$67,070	\$23,405	3.4

Annual Reduction in CO2-equivalent: 1.34 lb./sq.ft.-year, 70,667 lb./building-year
Increased Cost / lb. CO2-e reduction: \$0.95

Conclusions

Regardless of the building design, occupancy profile and number of stories, the incremental improvement in overall annual energy performance of buildings which exceed the 2008 Title 24 Building Energy Efficiency Standards by 15% appears cost-effective. However, each building's overall design, occupancy type and specific design choices may allow for a large range of incremental first cost and payback. As with simply meeting the requirements of the Title 24 energy standards, a permit applicant complying with the energy requirements of a green building ordinance should carefully analyze building energy performance to reduce incremental first cost and the payback for the required additional energy efficiency measures.